The American Navy 1865-1882

by

William Howard Roberts

Submitted in Partial Fulfillment
of the Requirements for the
Degree of Bachelor of Science
at the
Massachusetts Institute of Technology
February, 1973

Signature of Author . . . . . .
Department of Humanities, January 24, 1973

Certified by . . . . . .
Thesis Supervisor

Accepted by . . . . . .
Chairman, Departmental Committee on Theses

Abstract

The United States Navy reached its nadir during the period 1865-1882. This paper is an attempt to detail the policies which brought about this decline, paying special attention to the origin of these policies in technologically-induced value conflict, and to trace the factors which brought about the rebuilding of the Navy in the 1880's.

It is concluded that the primary reason for the decline of the US Navy during the period under study was the combination of national preoccupation with other matters and technological controversy,

Thesis Advisor:

David B. Ralston
Associate Professor of Humanities

Table of Contents

Introduction

The sea has been a primary concern to North Americans since the founding of the first British colonies in the Seventeenth Century. For the first century and a half of North American settlement, there was no American naval policy – the colonies prospered under the protection of the Royal Navy – but with American independence came the need for a national maritime policy and a national navy.

Naval policy has taken many forms since 1775. It is the intention of this paper to trace some of these trends, to examine specifically the period 1865-1882, during which the US Navy reached its nadir, and to suggest some of the causes of both the Navy's decline and its resurgence.

Beginnings and Growth: 1775-1840

The outbreak of the American Revolution placed the United Colonies in a highly vulnerable position. Chief among the reasons for this was that most of the population and the industry were concentrated near the coastline. Transportation of goods in bulk or over long distances was practical only by ship, due to the primitive state of land transport, and the colonials were far from self-sufficient; most manufactured goods came from overseas.

This meant that the British, who possessed the world's largest navy, held all of the trumps. With their control of the sea, the British could move troops freely from place to place, and strike without warning. They could deny to the colonists the use of the ocean, forcing them to rely upon slow, expensive, unreliable land transportation. They could prevent the colonies from obtaining goods manufactured overseas. Finally, and extremely important, British command of the sea meant that as long as a British army could retreat to the sea it could be beaten but not destroyed; the Navy could embark the troops and land them elsewhere.

The colonies had neither the time nor the resources to build a fleet capable of contesting British naval superiority. While it was possible for the colonists to produce privateers converted from merchantmen, and small ships of war, the construction of ships of the line was beyond their capabilities, in terms of both industrial resources and skilled labor.

Thus the naval portion of the American Revolution consisted of privateering and a few one-to-one frigate duels. Despite the capture or destruction of many British merchantmen and the glory of ship-to-ship battles such as that between the *Bon Homme Richard* and the *Serapis*, the Royal Navy remained firmly in command of the sea around the North American continent. It was not until that control was challenged by the French that the colonials were able to win a decisive victory – the French gained control of a limited but critical portion of the sea for a limited but critical time and thus cut off the British army's retreat from Yorktown.

The return of peace soon found the United States without a navy, the last Revolutionary ship being auctioned in 1785. American commerce, which flourished immediately after the revolution, began to suffer as the Barbary states realized that American shipping was no longer under British protection. The outrages of the Barbary Corsairs and the insults to neutral rights which resulted from the Wars of the French Revolution and Empire led to a limited rebuilding of the Navy in the period 1795-1805.

The new United States Navy, while frigate for frigate superior to any other, was far too small to affect the Royal Navy when the United States finally entered the Napoleonic Wars. For the second time, though British commerce suffered from privateers and American frigates won glory in single combats, the Royal Navy methodically blockaded American ports, captured most of the American cruisers, and swept the seas clean of American commerce.

American naval strategic policy of the period may be somewhat simplistically described as "coast defense and commerce raiding." It rested on several assumptions. First, a navy could quickly and easily be improvised from the merchant marine. Second, commerce raiding by these improvised cruisers, privateers, and the few regular naval vessels would wreck an enemy's commerce and tie down his navy in attempts to protect what little shipping remained to him. Third, land fortifications were sufficient to protect the coastline

and ports from invasion and bombardment.

All of these assumptions were proven false by the War of 1812. No privateer or squadron of privateers, or even squadron of frigates, could stand up to a line-of-battle-ship, and the American liners authorized during the War were not completed in time to serve in combat.[1] The British blockade thoroughly wrecked American commerce[2] and helped to protect British commerce by bottling up American privateers and by depriving them of ports into which they could send their captures. The convoy system further reduced British losses. Coastal forts could not protect the coastline from raids, let alone prevent invasion and the capture of the national capital. In short, the War of 1812 was an unmitigated maritime disaster for the United States.

American policy, despite the adage that one learns more from defeat than from victory, remained the same until the War Between the States. A primary reason appears to be self-delusion on the part of the American people. On the basis of a few victorious single-ship frigate actions, the victories of Perry and MacDonough on the Great Lakes, and the limited accomplishments of the privateers, the myth became established that the US had, for the second time, defeated the British at sea. Commerce raiding received the credit.

The "myth of victory" was not the only reason for the continuation of the coast defense/commerce raiding policy. A major factor was money — whatever their merits or demerits, ships-of-the-line and a naval establishment undoubtedly cost money. The rise of the agrarian Democratic Party produced a Congressional majority and an Executive beholden to the inland states, where people were opposed to spending the farmers' money on a "luxury" which would benefit only the mercantile classes.[3]

The other major factor was that the Americas were geographically isolated from Europe by a vast ocean. (Britain, it is noted, maintained the blockade during the War of 1812 from Canadian and West Indian bases.) Further, opponents of naval expansion claimed that a navy would encourage the government to become entangled in foreign quarrels instead of simply protecting itself.

Some sort of force was required to guard American commerce, however, as the depredations of the Barbary states had shown. The Navy was allowed to complete some of the frigates and ships-of-the-line which had been begun during the War of 1812, and with

this small force hunted pirates, intercepted slavers, and showed the flag abroad for many years.

Technological Advances: 1840-1860

The missions of pirate- and slaver-hunting and flag-showing were performed as they had been for years by other navies, with ships not much different from those of the late 1600's. A revolution was brewing in naval technology during this period, though. Steam propulsion had been introduced in the early 1800's, and so rapid was its development that by 1860 it was considered reliable enough to serve as the prime mover of warships. Artillery had been the same for centuries, but by the 1840's the smooth-bore, shot-firing, muzzle-loading cannon was being complemented by tolerably effective shell-firing, rifled, and breech-loading guns. The US Navy, despite its poverty-stricken condition and strategic stagnation, participated in these technological advances.

Auxiliary steam propulsion entered the US Navy with the *Fulton II* in 1837.[4] She was followed by two sidewheel frigates launched in 1841. The basic drawback of sidewheel propulsion, the vulnerability of the machinery and paddles to enemy fire, was overcome with the launching in 1843 of USS *Princeton*, the first propeller-driven ship in any navy.

Shell-firing flat trajectory weapons (as opposed to mortars) had been brought to a point of practicality by Henri-Josephe Paxihans in the 1820's and had been adopted by many of the world's navies, including the US Navy, by the 1840's.[5] Wooden ships were highly vulnerable to shellfire, but Paxihans himself had suggested armoring ships with armor. In 1842 Congress authorized the so-called "Stevens Battery", the first ironclad warship authorized for any navy.[6] It was never completed, but the British and the French built armored floating batteries during the Crimean War, and France launched the first sea-going ironclad warship in 1859.

Despite its adoption of the new artillery and propelling machinery, the US Navy was not in good shape by the 1850's. Though the period 1837-1845 was a relatively prosperous one for the Navy, the Administrations of the 1820's and early 1830's had provided little upon which to build. Further, the Administrations of 1845-1853 abdicated leadership to Congress, which engaged in a flurry of patronage deals that resulted in increased naval

expenditures but decreased fighting ability. By 1853, the US did not have a single warship capable of resisting any first-class European ship.[7]

At this time, however, the issue of slavery began to become more immediately important. With the admission of California to the Union in 1850, as a free state, the balance between slave states and free states in Congress was upset. Southern leaders appear to have desired to redress the balance by forming new slave states from territory in Latin America, specifically Cuba.[8] Naval forces were necessary to carry out such schemes, and shallow-draft ships would be able to patronize shallow Southern harbors, and these considerations were apparently factors in the passage of bills in 1857 and 1858 authorizing twelve shallow-draft steam sloops.[9]

In 1860 Southern Congressmen again proposed shallow-draft warships, but by the time the measure came to a vote it had become evident that the ships might be used as well to attack the South as to defend it. Southerners, switching positions, joined with other anti-Navy forces to defeat the bill. In February, 1861, however, a bill providing for seven more such ships passed the Congress; the departure of Congressmen from the seceeding states had weakened the Southern bloc.[10]

The War Between the States: 1861-1865

At the outbreak of the War Between the States in 1861, the task confronting the United States was immense, far greater than that which faced the Confederacy. To win, the CSA had merely to maintain the status quo; the Union had to invade and subdue the Confederate States.

The Navy's part in this endeavor, as it developed early in the War, was to blockade the Confederate coastline, protect Union commerce from Confederate raiders, and assist Union armies, both on the seaboard and in inland waters. The pre-War Navy was manifestly unequal to these tasks.[11]

The Confederates, on the other hand, desperately needed all manner of military supplies, from muskets to railroad rolling stock.[12] These supplies were available only from Europe. The Confederacy, to pay for what it needed, had much cotton and tobacco. The problem was to transport the produce to Europe and the military stores back to the

Confederate States; the Confederacy had little merchant shipping and no navy at all.

The Union had much greater resources than did the Confederacy, in merchant shipping, merchant seamen, shipbuilding facilities, and ironworks.[13] This was as well, since the task of interdicting 3100 miles of coastline was immense. The problem was aggravated by President Lincoln's blunder in announcing a blockade, rather than simply closing the ports of the rebellious areas. First, this meant that Lincoln was implicitly recognizing the Confederacy as a sovreign nation. Second, closing the ports was an action which could legally be taken by decree alone, whereas under international law, a blockade had to be effective to be legal.

Each power began to improvise a navy. In the North, this took the classic improvisational form of converting merchant ships into gunboats, as well as rushing to complete some ships which were under construction and beginning the construction of many others.[14] In the South, the paucity of merchant ships and seamen incuded the CSN to concentrate upon building a few armored ships with which to break the blockade, and upon the purchase abroad of warships for commerce raiding. The Confederacy and many private individuals went into the business of blockade running, which, in the early period of the War, was ridiculously easy.[15]

The US had appointed a board of naval officers to make recommendations on ironclad construction. This board, apparently in large part ignorant of European progress (e.g., the members felt that rolled iron plates were superior to hammered iron, a finding contrary to that of the British and the French), recommended the building of three armored vessels, a move they considered experimental.[16]

Of these three ships, the lightly-armored *Galena* was not a success; after being roughly handled by Confederate batteries at Drewry's Bluff, she was rebuilt as an unarmored ship. *New Ironsides* was a full-rigged broadside-battery auxiliary steamer, built along the lines of the French *La Gloire*. She was moderately successful.

The third ship was USS *Monitor*. The contract for *Monitor* was let to John Ericsson on 4 October 1861.[17] The design Ericsson proposed was unique. It was intended to combine shallow draft, good gun-power, good protection, and a small target area. It did so, at the expense of crew comfort and seaworthiness.

Monitor was completed on 25 February 1862 and was sent to Hampton Roads, arriving on 8 March. Her 9 March duel with CSS *Virginia*, a casemated ironclad converted from the salvaged screw frigate USS *Merrimack*, resulted in little damage to either ship.

The battle did, however, exert a decisive influence on naval architecture worldwide. The most important lesson was that only iron armor could resist contemporary artillery — wooden ships were obsolescent. (Some other conclusions drawn, such as the idea that ramming would play an important part in future battles and that the monitor type of ship was superior to other types of armored vessels, were decidedly incorrect.[18])

Many more monitors were built, in various sizes. The success of the armored warship brought on a debate about US naval policy in general — the ironclad rendered existing European fleets almost useless, and thus the US could start level with the Europeans in a naval race rather than having to overcome a tremendous European lead. Should the US compete or not?

The situation was, at this time, complicated by the attitude of England towards the Confederacy. English sympathy for the CSA was partly due to a feeling for the Southern aristocracy and the typical British sympathy for the underdog, and partly due to England's need for Southern cotton as a raw material for her textile mills. A major factor was the incident known as the "*Trent* affair", of 8 November 1861, wherein Confederate diplomats were removed by force from the British packet *Trent* by Captain Charles Wilkes of USS *San Jacinto*. The *Trent* affair inflamed popular opinion in Britain, although the British government was less anxious to fight than were the people. The affair ended in American apology and the prisoners' return, a legacy of English anger — and the feeling in the US that war with England must be avoided for the time being "for the plain reason that *now* we are unable to meet it."[19]

This did not mean that war with England must necessarily be avoided for all time. Following the confirmation of the effectiveness of the *Monitor* in the 9 March battle, contracts were let during the spring and summer of 1862 for ten coastal and seven sea-going monitors, and during September and October, 1862, for nine more coastal monitors. Four sea-going monitors, the equals of any ships in the world, were begun in 1863.[20] The Confederacy had no seagoing ironclads, and no means to build or purchase more than a few. Against whom, then, were these monitors to fight?

At the same time, late 1862 and early 1863, the *Wampanoag* class of fast wooden cruisers were laid down. These ships were, in their designer's words, ". . . designed for an exceedingly fast ocean cruiser, fast enough to catch any British mail or merchant steamer . . ."[21] though the class was presented to the country at large as a means of hunting down Confederate cruisers.

The sea-going ironclad US Navy failed of its promise. The main reason was a change of heart on the part of the British. This reversal of public sympathy was based upon a growing realization of Confederate failure, manifested by the Battles of Antietam and Gettysburg, and upon the Emancipation Proclamation. One result was that on 3 September 1863 the British government issued orders to prevent the sailing of two sea-going ironclad rams being built by Laird and Co. for, through a chain of intermediaries, the CSN.[22]

These ships might have caused the US Navy a serious, though not overwhelming, problem. The British action removed both the immediate threat posed by the "Laird rams" themselves and the longer-range threat of war with England. As the prospects of war on the open sea declined, so did the urgency with which the new ships were constructed; the fast cruisers were not finished until after the War, as were seven of the monitors. Five of the sea-going monitors were never completed.[23]

The remainder of the War Between the States, while by no means uneventful for the Navy, held no revolutionary developments. Gradually, the blockade was tightened, the Confederate ports captured, and the rivers brought under Union control. In the business of winning the War, however, no thought was given to the irony involved in doing so: The South was carrying on, partly by intention and partly because of lack of resources, precisely the sort of war envisioned by US strategists since the War of 1812. The Confederates built fortifications for passive coast defense and raided Union commerce using fast wooden cruisers. Both halves of the strategic theory proved futile.

In the first place, the Confederate forts, though numerous and armed with the best Union guns of the day,[24] were unable to stop the ironclad Navy. Fortified positions, from Island Number Ten and Mobile Bay to Fort Fisher, proved unable to resist determined amphibious assaults.

Secondly, despite the damage to Union shipping caused by Confederate cruisers, the

Northern war effort was not seriously hampered. The Union's overseas commerce simply moved to neutral flags, and American ships were sold to neutral owners — the US merchant marine carried 66.5% of all US foreign trade in 1860, but only 27.7% in 1865, though total imports and exports increased slightly during the War.[25] This increase in trade was despite the fact that the CSN captured or destroyed about 100,000 tons of US shipping and forced the transfer of over 900,000 more.[26]

At sea the War Between the States looked much like the Amyrican Revolution and the War of 1812. In each case, the dominant naval power enjoyed great freedom of action, and hampered its enemy's war-making by blockade. In each case, an army which could establish contact with the coast could be supplied or evacuated, as necessary. In each case, the weaker naval power attempted to force the stronger to its knees by commerce raiding and to protect its own coastline passively, by means of fortifications, and in each case the weaker failed to accomplish its objectives.

The lessons of the War were clear. First, a navy could no longer be improvised effectively. Second, steam and armor had displaced sails and wood. Third, coast defense and commerce raiding were strategic failures. Naval victory was won through command of the sea.

In addition, it had been shown that the organization and administration of a navy were not amenable to improvisation either. Administration needed a firm foundation upon which to expand in wartime, and ships required a great deal of practice in order to operate together efficiently. As has often been said about the armed forces of democracies, the Navy was just hitting its stride when the War ended.

Retrenchment to Reaction: The Post-War Decline, 1865-1868

The lessons of the War were not heeded. The Navy returned to its pre-War routine, apparently so completely that "... a visitor returning in 1870 after ten years' absence might never have guessed that the Navy had passed through any war at all ..."[27] This return was marked by periods of retrenchment and of reaction, and the period 1865-1868 was primarily one of retrenchment and demobilization.

The process of retrenchment began even before the final dissolution of the

Confederacy, when it became obvious that the Confederate States were close to defeat. A letter from the Navy Department, dated 24 February 1865, ordered commodores of the various blockading and river squadrons to reduce expenses.[28] By July the blockading forces were reduced to about 30 ships, from a strength of 471 in January 1865. On 14 August the Mississippi command was discontinued. By December the improvised wartime Navy was practically gone, with 340 vessels sold out of the service (there had been over 600 vessels on the Navy List at the beginning of the year[29]) and many others decommissioned.

Along with the demobilization of the blockading fleet came the re-establishment of the foreign cruising stations. The European, East India, and Brazil stations had been suspended upon the outbreak of the War, and the Pacific station reduced. By December, 1865, all were back in operation, with 36 ships total compared with the 31 available in 1860.[30] A West Indies squadron was projected for 1866. One hundred seventeen vessels of all descriptions were in commission on 4 December 1865.[31]

Reasons for this post-War retrenchment were those normally attending a return to peace. They were chiefly economy, efficiency, and social conditions.

The Navy had a budget of $116,781,675.95 for the fiscal year 1865; its average expenditure during the War had been about $72.5 million annually.[32] The US had had a budget deficit of $973.8 million in 1865 and had accumulated a war debt of over $3 billion,[33] not to mention the damage inflicted upon both North and South by the War. The demand for economy was therefore strong, and the federal budget for 1867 was less than half that for 1865.[34]

The US merchant fleet had been badly hurt during the War, and needed ships and seamen to regain its former position. The ships, converted merchantmen, sold out of the Navy were exactly the correct types. The Navy had added during the War, mostly from the merchant marine, about 7500 officers and 40,000 men.[35] Most of the officers, and almost all of the men, were returned to civilian life by early 1866.

The Navy was just as happy to be rid of the converted merchantmen. Few of them were suitable for retention once the emergency was over, as they were slow and mechanically unreliable.[36] The ships of the pre-War Navy, though well-built, were suffering from extremely hard usage, and many of the ships built as warships during the War had been

constructed of unseasoned timber and were already deteriorating.[37] Efficiency would be enhanced by retaining only the best ships and disposing of the remainder.

The American people were not especially interested in naval affairs at that point. The country had just emerged from a war far more intense than any ever fought in North America. There had been 618,000 deaths,[38] and though these casualties did not destroy national optimism as did, for example, those suffered by France in World War I, war weariness was great in both North and South. The Navy was an obvious place to make budget reductions, as the Army was needed to supply occupation troops in the South.

Reconstruction had become the the absorbing issue of the time. The Congress was embroiled in battles over the policies to be followed in rebuilding the South and the methods by which these policies were to be implemented, and did not have the time to worry about other matters, especially during its struggle for control of the Executive branch.

Further distracting national attention was the expanding economy, especially in the West. Chief among the exploitive schemes which had been shelved during the War were the projects for building transcontinental railroads, and a railroad-building boom swept the US. First fruit of the transcontinental projects was the Union Pacific/Central Pacific Railroad, completed in 1869, but as the railroads moved west, they opened up larger and larger areas for speculative ventures. After getting off to a slow start, which seems to have been the result of the change-over from military to civilian production, the economy grew steadily throughout the late 1860's.

These distracting influences, combined with the generally-held belief that the armed forces of the United States were the finest in the world, were to produce an attitude of complacency in the public mind. For the first few years after the War, this attitude was well-founded.

At the close of the War Between the States, the United States had possessed the world's most powerful ironclad fleet. Within its own coastal waters, the US Navy was superior to any possible invader, and there were under construction ships designed to extend US naval superiority beyond the coastal area.[39] Besides its armored ships, the US had under construction a class of commerce raiders designed to be superior to anything else afloat, and

it had available large numbers of trained men with whom the fleet could be manned. The Navy possessed adequate supplies of reasonably modern artillery,[40] a proven supply system, and an acceptable shore establishment.

There were defects, and serious ones, but for the most part they remained covered by the gilding of victory. Some of the problems were quick to surface, others were not so obvious, but most of those that would afflict the Navy during later years were becoming obvious by 1869.

For example, the shore establishment was acceptable only if the country's private works could give it massive support. The Navy maintained, in 1868, seven dockyards but only six drydocks, of which only three were permanent stone structures.[41] Secretary of the Navy Gideon Welles pointed out that

> We have no conveniences or appliances whatever for the construction of the hulls of iron armored vessels . . .[42]

and that Great Britain and France possessed three dockyards apiece which contained, in each yard, more drydocks than did the entire United States. Plans for rebuilding and improving the Norfolk and Pensacola yards, and for building up the Mare Island yard (the only one on the Pacific Coast) fell upon deaf Congressional ears.

Another example of difficulties in store was the organization of the Navy Department itself. Each of the bureaus into which the Department was organized was practically autonomous, subject only to the direction of the civilian Secretary, who was generally relatively ignorant of naval matters. With men less able than Welles and Assistant Secretary Gustavus Fox in control, the Navy's administration could easily fall apart.

The greatest problem, however, lay not in technical or administrative fields, but in the personnel of the Navy and their reaction to change. The years 1866 through 1868 exhibit the change of attitude from one of retrenchment to one of reaction in the service.

The 1860's were a period of extremely rapid technological change. Ships which were ultra-modern when they were designed might be obsolescent a year or two after completion — the original *Monitor*, for example, would have stood little chance against her namesakes of a year or two later.[43] Sailing ships had undergone little change in two centuries, but iron ships were changing from year to year. Keeping abreast or ahead of current developments

meant a great deal of experimentation with new ships, new weapons, new machinery, and new techniques, which was expensive.

Further, this technical development was extremely disturbing to the older generation of naval officers. Most of them had been raised in the pre-War days when the Navy had been made up of sailing ships with auxiliary engines. They had been forced to accept highly unconventional ships during the War, but when the Navy reverted to a peacetime footing, they began to feel that unconventional designs and unconventional methods of propulsion were no longer needed and that it was time to go back to the conventional peacetime Navy — the sailing Navy.

The controversy over the retention of sail power is the prime example of naval reaction to technological change. The Secretary's *Annual Report* for 1861 stated that

> No sailing vessels have been ordered to be built, for steam as well as heavy ordnance, has become an indispensable element of the most efficient naval power.[44]

and, indeed, sailing ships had not played a large part in the War. The first stirrings of reaction appeared in 1865 in the newly-issued Navy Regulations:

> As to the use of sails . . . each Commanding Officer must be guided by his own judgment, but with the understanding that he must be prepared to justify every expenditure of fuel for steaming purposes . . . he is to take care, first, that steam is not used at all when the service can be equally, or nearly, as well performed without it; secondly, that sail is never dispensed with when it can be employed to advantage to assist the steam; and thirdly, that full steam power is never employed, unless in chase, or absolutely necessary, the cause for which must be reported to the Department in writing.[45]

> Whenever he joins his Commanding Officer after separation, or when he arrives at any port where there is a superior officer in command, he shall report the number of hours the vessel was under steam and under sail, and the circumstances which rendered the use of steam necessary.[46]

Note, however, the contrast with the Secretary's statement in the 1865 *Annual Report*:

> . . . The skillful disposition of the sails . . . is no longer necessary . . . To confine himself to seamanship, without the ability to manage the steam engine, will result in his [the naval officer's]taking a secondary position . . .[47]

and the Secretary's remarks were prophetic. The controversy began in earnest, pitting the older line officers against the engineering officers, and the problems which arose during this period bedeviled the service for 40 years.

A similar controversy had occurred long before. When shipboard fighting had been based on infantry board-and-storm tactics, there had been two kinds of officers aboard ship — the fighters, usually landsmen, who commanded the troops and who were in overall charge, and the seamen, who merely worked the ship and were in a secondary position. As the ship-killing heavy cannon began to take the place of the man-killing weapons of the infantry, in the late Fifteenth and early Sixteenth Centuries, it became important that the fighters also know how to work the ship to best tactical advantage.

The fighting officers considered the working of the ship a menial task, beneath their dignity. Thus the seamen, who had previously been specialists in the operation of the ship's motive power, gradually became sea-fighters and displaced the landsmen from their pre-eminent position. The concept of the officer of the line — the sea-fighter — was taking hold in the Royal Navy as early as the late 1500's, and had reached fruition in the middle 1600's.

As long as the motive power of ships stayed the same, the command arrangements need not change, either. With the advent of efficient steam propulsion, however, something had to give — there was another split developing between the men who ran the ship and the men who directed and fought her. The line could have taken over the working of the engines, but, like the purely fighting officers of the earlier centuries, they considered such menial tasks beneath them. A separate class of officers appeared — the Engineer Corps.

With the increasing importance of steam came increased status for the engineers and a decrease in the relative position of the line officers. The line reacted to this loss of prestige in various ways, including suggesting that the line take over the operation of the engines, but the prevailing attitude was that the line would not become "engine-drivers" and would definitely not surrender its supreme status. Since the importance of the engineers stemmed from the importance of their engines, the obvious solution (to line officers) was to downgrade the importance of steam.

The back-to-sail faction had several powerful arguments, including human conservatism, economy, the utility of sail in the training of seamen, and the vulnerability of marine engines to derangement. On the side of the engineers were the combat experiences of the War Between the States, wherein it was proved that steam was an absolute necessity for

naval operations against a contemporary enemy. Though the ultimate solution in the US Navy was to be the amalgamation of the line and the engineers, that was many years away, and the engineers meanwhile faced an insurmountable obstacle in that the senior officers of the Navy had been raised in sailing ships. The senior men had the authority to decide to return to sail and the power to make the decision stick.

In 1867 Daniel Ammen was ordered to the command of USS *Piscataqua*, a new wooden screw steamer, and was assigned to the Asiatic Station. He voiced one of the principal arguments of economy:

> . . . that, in a voyage more than half around the globe, to reject the aid of the winds that a Creator has given to waft people hither and thither, and to use steam, instead, would subject us, and justly, to the ridicule of the naval world . . . for no nation can afford to reject nature's gifts, — and we had just then passed through a civil war and were burdened with a debt of three thousand millions of dollars.[48]

The argument of economy was given added force by the lack of foreign bases where a steamship could refuel. Unlike the British and French, who maintained coaling stations as part of their colonial empires, American ships in overseas areas were dependent upon expensive commercial coal supplies, and, additionally, in time of war, upon the generosity of neutral governments. Far better to cruise under sail, the argument ran — not only was it cheaper, but no one would have to or would be able to withhold the wind because of the laws of neutrality.

The price of coal was the determining factor. The price paid by the Bureau of Equipment and Recruiting averaged $4-5 per ton during the late 1860's; it was $11/ton during the period 1872-1876.[49] The low efficiency of marine engines and boilers made steaming a ship quite expensive.

For example, for one day's steaming at economical cruising speed, USS *Wampanoag* would have required, in 1868, about $200 worth of coal; in 1874, $450. At full speed, the cost for coal alone would have been $720 and $1500, respectively. Assuming a total of 90 days' steaming over the year, a year's operation at cruising speed would have cost over $51,000 in 1874.[50]

The marine engines of the day were breakdown-prone machines, primarily because of their reciprocating nature,[51] but also because of a lack of methods for non-destructive testing in manufacture. Further, each engine was unique; even engines built by a single manufacturer to a single set of specifications had differences. Thus the repair of marine

machinery required much knowledge and much heavy equipment for producing repair parts.

The former the US Navy possessed, in the Engineer Corps; the latter it did not, especially overseas. Accident or enemy action could leave a ship with damage unrepairable by the ship's company, no matter how knowledgeable they were, and thus make her dependent upon foreign dockyards. An additional consideration, with marine power plants unreliable and no means of long-distance communication, a ship needed a minimum amount of sail power as an emergency power source.

The foremost reason for the return to sail, however, was natural human resistance to change. This combined with the ideal of "seamanship" to produce the argument which underlay many of the others — the steamship simply did not produce seamen, and seamen were the most important feature of a navy. The prevailing idea was stated by ADM David Dixon Porter

> It [unnecessary steaming]causes the wearing out of boilers and machinery, and inflicts serious injury upon the discipline of the service, preventing officers and men from becoming expert in matters of seamanship. . . . [52]

and by RADM Edward Simpson

> . . . a seaman trained to a sailing ship acquires a degree of personal confidence which can come from no other source . . .[53]

The best example of the attitude which was becoming dominant in the US Navy by 1868 is the case of USS *Wampanoag*. As mentioned above, the *Wampanoag* class was laid down in 1863 under the threat of war with Great Britain. As the war threat receded, work on the cruisers slowed down. *Wampanoag* was finally completed in late 1867.

The *Wampanoag* and her near-sister *Ammonoosuc* had been designed by Chief Engineer Benjamin Isherwood for speed. Isherwood said,

> . . . other qualities were to be necessarily sacrificed in a greater degree than usual to obtain unprecedented speed.[54]

and this was indeed so.

Outside, they did not look like other ships. They were too long and thin; *Wampanoag* had a length-to-beam ratio of 7.6, while such ships of the pre-War steam Navy as USS *Hartford* and USS *Powhatan* had l/b ratios of 5.1 and 5.6, respectively, and old ships-of-the-line such as USS *Ohio* had ratios of about 4.0. The *Wampanoag*'s masts were not in the best positions for efficiency under sail, and they did not carry enough sail area to suit

prevailing doctrine. Further, the ship carried four huge and unsightly smokestacks.

Inside, she told a tale of "other qualities . . . sacrificed" for speed. She was equipped with eight vertical water-tube boilers and four superheater boilers, and two engines of 100" bore and 4' stroke.[55] It was the arrangement of the machinery which made her masts look wrong — rather than fitting the machinery around the masts, the masts were accommodated to the machinery. The boilers were enough to mark her as advanced in a period when most ships had horizontal fire-tube boilers, and the separate superheater boilers were highly unusual, since the standard practice was to build the superheater tubes into the main boiler flues.

The *Wampanoag*, fully armed and equipped, put to sea for her trials on 7 February 1868. Her captain, J.W.A. Nicholson, made a report almost lyrical in its praise of the ship.

> Under sail, with a fresh breeze, she steers well and sails fast, but in light breezes not well, as she needs to move four to five knots through the water to turn the propeller. Under steam and sail she 'lies to' well, shipping no seas.
>
> Under all circumstances she steers perfectly east . . .
>
> Under all sail by the wind, with a moderate breeze and smooth water, we logged seven to eight knots . . .
>
> I consider the 'Wampanoag', as a ship, to be faultless in her model, and, as a steamship, the fastest in the world.[56]

Captain Nicholson did find the ship cramped, however, and suggested that a spar deck be added to increase living and storage space.

The Board of Engineers appointed to try the ship submitted the results of their speed trials, noting that a speed of 17.75 knots (20.465 statute miles per hour) had been obtained and logged four separate half hours, and that it was only necessary "that the men shall be properly drilled at their duties in the fire-room and coal bunkers to maintain that speed continuously in smooth water."[57]

This speed was cause for comment. The fastest trans-Atlantic packets of the day averaged 14½ knots in smooth water, and the fastest of the day, SS *Adriatic*, had once gone 15.91 knots over a measured mile in smooth water.[58] In fact, the *Wampanoag* had maintained a sustained speed of 16.6 knots for over 36 hours. This meant that the US Navy had a ship which could catch any merchantman afloat and run away from any warship — a ship which, with her high speed and moderately heavy armament, was precisely the ship

needed to implement the commerce-raiding strategy espoused by the United States.

At this time, however, the line-engineer controversy was coming to a boil. In addition, there were factions within the Bureau of Steam Engineering, aligned pro-Isherwood and anti-Isherwood,[59] and the latter combined with the line officers to attack the *Wampanoag* test results. These opponents of Isherwood first charged that the test was a fraud, but were forced to admit finally that the test results were legitimate. However, they claimed, the tests had been made under "freak conditions" of good weather (notwithstanding the report of weather conditions — which were foul — which had been included in the original report).

At this juncture the *Ammonoosuc* underwent her own sea trials. On these trials, which began on 15 June 1868, she steamed an average of 16.8 knots.[60]

The trial of the *Ammonoosuc* would appear to have dealt the opposition a mortal blow. Yet *Wampanoag* was laid up in the fall of 1868, and, in 1869, condemned by a board of survey as utterly worthless. (See below.)

Meanwhile, as mentioned above, changes had been taking place in the Navy Department. Gideon Welles had attempted, after the end of the War, to re-organize the administration of the Department, but he and the rest of the Cabinet were caught up in the struggle over Reconstruction and the attempts of the Radical Republicans in Congress to subdue President Andrew Johnson.

This conflict between the Legislative and Executive branches of government had been smouldering throughout the War, and finally burst into flame when Johnson, a far less tactful man than Lincoln, on 12 August 1867 removed Edwin Stanton from his position as Secretary of War. This removal was carried out under the provisions of the Tenure of Office Act, passed over Johnson's veto on 2 March 1867, which stated that any official to whose appointment the Senate had had to consent was entitled to hold office until he resigned or until the Senate had concurred with the wishes of the President in dismissing him. Johnson transmitted his reasons for Stanton's dismissal to the Senate, which was not then in session, and appointed U.S. Grant as interim Secretary of War.

In retrospect, it appears that Johnson was on firm legal ground, as the Act also stipulated that the term of a Cabinet officer was limited to that of the President by whom he had been appointed, plus one month, and Stanton had been appointed by Lincoln, not

Johnson. However, Radical Republicans in Congress, upon reconvening in November, evidently felt that the time for a showdown with Johnson had come. After considerable debate, the Senate on 13 December refused to concur in Stanton's dismissal, and Grant gladly gave up his duties as Secretary.

Johnson once again dismissed Stanton on 21 February 1868. Stanton refused to leave, and on 24 February the House passed an impeachment motion, accusing Johnson of high crimes and misdemeanors. After a vitriol-filled trial which lasted from 13 March to 26 May, the charges were dropped, Johnson having won acquittal on the three (of the original eleven) charges which had come to a vote. Stanton resigned when the results of the trial became known, and Johnson's new appointment for the post was confirmed by the Senate.

The aftermath of this episode was almost as unsettling as the proceedings themselves, as the result was an armed and uneasy truce between the Congress and the Executive. It was hardly the time to propose a sweeping reorganization of the Navy Department, especially since the Johnson Administration was close to its end and the country would soon be preoccupied with the upcoming Presidential election. As if outside interference were not enough, VADM David Porter, by this time the second-ranking officer in the Navy, was apparently working to undercut Welles wherever he could.

During the late 1860's, Porter was the leader of the movement to return the Navy to sail power. He was aided in his endeavors, not to say machinations, by his friendship with U.S. Grant. Grant had been favorably impressed by Porter during the Vicksburg campaign, and this impression had been reinforced over the remainder of the War. The two men appear to have been on excellent terms by 1868.

Grant was also closely acquainted with other senior naval officers, including notably COMMO Daniel Ammen. Ammen, whose views are quoted as note 48 above, was, like Porter, a line officer, and among the most conservative in the service. The influence of the senior line officers was growing, and with the accession of Grant to the Presidency, this influence predominated.

Thus by 1868 the stage was set for a sweeping reaction against the steam Navy. The line officers, doing what they thought was best, envisaged a return to the relatively uncomplicated era of the 1850's, and their influence and energy made it likely that this would come to pass.

"Grantism" and the Navy: 1869-1877

> Grantism is compounded in low greed, obtuse moral sentiment, shoddy display, the use of public offices for private gain, enriching all your relatives at the expense of the Government, the ignoring of all the better public opinion, the conception that high office is a reward and not an obligation imposed-in-fine, that the Government is to be administered in the selfish interest of the governors and for their aggrandizement.[61]

> . . . The image of the swine-pen is too gross. It [Congress] was rather an auction room, a gallery where men interspersed patriotic platitudes with bids for sectional advantage, class advantage, above all the advantage of special interests.[62]

Ulysses S. Grant was elected President of the United States in 1868. The voters appear to have expected several great gains from Grant's election: termination of the feud within the Republican Party, termination of disorders in the South, efficient management of the Government, and vigorous reform. Most of their hopes were based upon Grant's military career. Grant's status as a war hero enabled him to unite the Republicans behind him, and his military training had made him an exponent of order and discipline. He had run the armies of the United States efficiencly, and he had never associated with politicians.[63] Unfortunately, these hopes were not to be realized.

Grant's Administration made an inauspicious start. His selection of a Cabinet was haphazard, based upon the need to conciliate various power blocs within the Republican Party and upon the fact that Grant himself

> . . . looked upon Cabinet Ministers as on staff officers, whose personal relations with himself were so close that they should be chosen for personal reasons . . .[64]

In addition, Grant had broken sharply with Johnson when he left the office of Secretary of War, as he believed that Johnson had impugned his honor. As a lame-duck President, Johnson had taken measures which were, to say the least, discourteous to the incoming Administration, including negotiating with Great Britain over the so-called *Alabama* Claims and appointing as Ambassador to Mexico General William S. Rosecrans, who was openly hostile to Grant.[65]

Grant did not reveal most of his Cabinet nominations until his inauguration. The new Secretary of the Navy, Adolph E. Borie, was first apprised of his appointment by reading of it in the newspapers on 5 March 1869, the day after the inauguration, although Borie had spoken with Grant personally about other matters on 3 March.[66]

Borie seems to have been appointed because he was a friend of Grant and because he

was from Pennsylvania, as he was ignorant of naval affairs. He was a retired merchant, nearly 60 years old and infirm, and he made it known that he would resign as soon as he decently could.[67] It appears that an arrangement was made whereby Borie would be a figurehead and VADM Porter would actually run the Navy Department.[68]

Porter immediately moved to make the position of the line officers secure. Among his first actions were the dismissals of John Lenthall, Chief of the Bureau of Construction and Repair, and of Chief Engineer Isherwood, Chief of the Bureau of Steam Engineering. The dismissal of Isherwood was abetted by members of the Engineer Corps, for, as mentioned, Isherwood had made many enemies, personal and professional, during his ten-year tour as Chief Engineer.

Of far greater importance was Porter's move against the personnel of the Engineer Corps in general. The law which provided for rank within the Engineer Corps and related the engineers to the line provided that the engineers held relative, not absolute, rank, and provided that each grade of engineer was to rank "next after" the corresponding grade of the line.

In recognition of the growing importance of the engineers, Secretary Welles had, in March 1863, raised the relative ranks of the engineers. In practice, then, while the most senior Chief Engineer was junior to the most junior line Captain, for instance, both wore the same uniform and rank insignia, received the same honors, and so forth. Porter seized upon the wording of the 1859 law which established ranks to alter this situation.

Porter reasoned that the man who ranked "next after" the most junior Captain was equivalent to a Commander, and so on down. General Order Number 120, issued on 1 April 1869, stated that, since only Congress could fix the relative rank of line and staff officers, Welles' 1863 order was anulled. Senior Chief Engineers, instead of ranking with Captains, would now rank with Commanders; junior Chief Engineers with Lieutenants instead of Commanders [the Act of 1859, which established these equivalents, was passed before the creation of the grade of Lieutenant Commander; thus, the engineers involved lost two grades rather than one], and so forth.[69]

Porter followed up this General Order, about six weeks later, with a circular letter to station and squadron commanders which might be described as a masterpiece of malicious

subtlety. It said that

> The Department is informed that certain officers of the Navy are wearing the uniform of a rank above them.[70]

went on to state that ranking "next after" meant ranking with the grade below, and that officers would wear in each case a corresponding uniform."[71] Commanders were to see that this order was carried out.

Effectively, General Order 120 and Porter's interpretation of it demoted every engineer in the Navy, save three who remained in the grade of Captain, one grade; 40 engineers who had ranked with Commanders were reduced two grades, to Lieutenants. This was a stunning blow. As one officer put it, in another context,

> Few men outside a military government can appreciate the importance of rank to a man under its control. Rank means power, honor, and influence. The higher the one, the more abundant the others. . . .[72]

It was especially galling for men who had been accustomed to certain prerogatives to see them vanish. Though the Medical and Pay Corps suffered more severely from this order than did the engineers, it would appear that later surgeons and paymasters were advanced more rapidly than their engineer counterparts.[73] However, the doctors and pay clerks did not matter — what mattered was that the Engineer Corps had been humiliated. The advocates of steam power had been brought sharply to heel.

Porter's term as *de facto* Secretary ended with Borie's resignation. George M. Robeson of New Jersey became Secretary of the Navy on 25 June 1869. One friend of Secretary of State Hamilton Fish who knew Robeson wrote to Fish, saying that Robeson was a first-rate judge of wines, a second-rate trout fisherman, and a third-rate Jersey lawyer, with the implication that he would make a fourth-rate Secretary. This proved to be all too true; in an Administration which, over the years, included many poorly-chosen officials, Robeson stands out as a particularly bad appointment.

Robeson was one of the more corrupt politicians of the period. This is, admittedly, quite a strong claim to make, considering that during Grant's Administration scandals involved a Secretary of the Treasury, a Secretary of War, Grant's personal secretary, and the Vice-President of the United States, but it is borne out by the revelations of the Congressional committee which investigated the Navy in 1876, after seven years of Robeson's stewardship. Among other things, the House committee discovered by inspecting

his bankbooks that Robeson had deposited over $300,000 between 1872 and 1876 alone, as well as investing heavily in real estate.[74] The salary of a Cabinet officer at this time was $10,000 annually.

All of this knowledge lay in the future, however, and when he accepted the appointment Robeson appeared no more unfit for the job than many another politically-appointed Secretary. He rapidly acquired opinions about the proper management of the Navy, which were quite similar to those held by Porter and his friends, and it is evident that Porter's influence on policy remained strong for some time.

This influence appears in Robeson's first *Annual Report* as Secretary, in which he put forth a plan for the peacetime organization of the Navy. This plan envisioned, in time of war, a coast defense and commerce-raiding strategy. The nucleus of the peacetime fleet was to be composed of sea-going ironclad frigates, of the same general type as the *New Ironsides*, and the remainder of the cruising fleet was to be wooden. The coastal defense was to be based upon the monitor type of vessels.

The proposal required ten of the sea-going ironclads (full-rigged, with auxiliary steam engines), which were to serve as flagships and relief flagships for the five peacetime cruising stations. Four of these, Robeson stated, should be built immediately. There were also to be 30 large and 40 small wooden cruisers. The monitors were to number 40, with those which were under construction to be completed and the others repaired; apparently the weakest ships were to be sold. Another 26 wooden ships were wanted for various purposes, such as hydrographic research and store-ships.

This plan was a reasonable attempt to meet the naval needs of the United States as the line officers perceived them. The plan was politically feasible, they apparently thought, and would appeal to Congress on the bases that the new establishment would contain 24 fewer ships than the then-current one, would reduce expenses for maintenance, and would enable the Navy to use what ships it had, as "most of the vessels for the coast defense, and a considerable number of the wooden ships" were already on hand.[75]

The proposal was not accepted. Congress was in no mood to spend money, as the country had not yet emerged from the recession which followed the Panic of 1869, and Robeson did not renew his proposal. The Navy's position, both absolutely and relative to

European navies, declined year by year.

The Navy List contained 203 ships in March of 1869, according to the Secretary's report, but it was stated that no more than 18 were in condition for real service. The total included 52 ironclads. Of these, six were still under construction; of the remaining 46, 29 were riverine and shallow-draft types unable to operate even in coastal waters under any but perfect conditions. This left 17 ships which might be of use at sea, of which perhaps five could have dealt successfully with European ironclads of the day.

However, not one of the monitors was fit for immediate service. Their frames had been built of unseasoned timber and this timber had rotted, leaving their structures unsound. Though their hulls were in reasonably good condition, due to their having been laid up in fresh water rather than salt, it would take some time to make them fit for duty.

The wooden ships were not in much better shape. Only 43 were in service with the various squadrons, including ships carrying as few as two guns. Over one-fifth of the wooden ships were sailing ships, without even auxiliary engines. The Navy List included such relics as the old frigate *Constitution*, and the old ships-of-the-line *New Orleans* and *Chippewa*, which had remained on the stocks, uncompleted, since 1815.[76]

At this point it is necessary to examine the role that strategic and technical ideas played in naval development. The facts of naval deterioration are not at issue — it is a matter of record that the naval position of the United States *vis a vis* European powers worsened after 1865, that the US Navy continued to cling to wooden sailing ships with auxiliary engines while European navies were building armored steamships. The major question is why the United States continued building ships which were obsolete before they were laid down.

One school of thought maintains that naval officers returned wholseale to the "traditional" strategy of commerce raiding and coast defense, simply because it was traditional — that the lessons of the War Between the States were lost in "intellectual stagnation."[77] ". . . naval officers again ignored the lessons . . . and reverted to their traditional endorsement of commerce raiding and passive coast defense . . ."[78]

The other major school points out that various people, both European and American, had been writing about the concept of sea power for several hundred years, and insists that, "Naval officers of the post-Civil War era were thoroughly familiar with the concept of sea

power in all of its ramifications."[79] It is stated that the naval officers who supported the "traditional" policy did so because they were politically astute and could see that Congress would not provide funds for anything more,[80] and that numerous officers had "argued for the creation of great navies."[81]

Both points of view are amply supported by their proponents with the writings of the officers of the day. This support, mutally contradictory, leads one to the conclusion that the truth lies somewhere in between the two positions.

It is almost inconceivable that naval officers could ignore completely the experiences of the War Between the States. The Union naval victory had been won despite the Confederate campaign of commerce raiding. Yet it is also very difficult to reconcile a wholesale acceptance of "sea power" with the almost complete lack of change apparent in the Navy's operational routine.

It is suggested that, during the period of Grant's Presidency, the strategic thinking of senior naval officers was based in large part not upon a rational policy, but upon a rationalized policy – that the reversion to sail was not a result of a rationally-determined strategic policy, but that the reversion to the coast defense/commerce-raiding policy was the result of the change from steam back to sail power.

It must be pointed out that this strategic thinking was largely the province of the senior officers. During this period there was developing an overall rift in naval professional opinion, which usually divided senior officers from their juniors. While there were differences of opinion among the larger groups, in general the senior officers took up conservative positions and the junior officers progressive or "reform" stances.[82]

This is not to say that senior officers were uniformly reactionary, or that junior officers were uniformly liberal. Many officers found themselves on the "conservative" side of some questions and on the "progressive" side of some others. Examples are Stephen B. Luce, of the Academy class of 1849, who despite his seniority was instrumental in establishing and maintaining the Torpedo School and the Naval War College against opposition from his more conservative colleagues, and Dennis Hart Mahan, Jr., who, though 20 years junior to Luce, joined the "conservatives" when the line officers' lobbying association was taken over by the junior officers a few years later.[83] However, Luce also

argued vehemently in favor of the retention of sail, both aboard operating warships and in the Naval Academy's training program.[84]

It was difficult for junior officers to express their views freely. They could not be held back from promotion, as in those days promotion depended entirely on seniority, but they could be assigned to less-desirable stations or placed on "waiting orders" at greatly reduced pay. The head of the Bureau of Navigation, which was the agency responsible for the assignment of officers, was from 1871 through 1878 COMMO Daniel Ammen, who, as we have seen, was not inclined to look with favor upon outspoken junior officers.[85]

The senior line officers had all been trained under sail. The most senior of them, still active in the 1870's, predated the Naval Academy — they had been apprentices, sent to sea as midshipmen to learn by doing. The others, of the classes graduated before the War Between the States, had received more theoretical education, but their training at sea had also been accomplished in sailing ships. As is usual, their early years under sail must have seemed far more attractive as they grew older than those years had seemed at the time; besides, these officers felt, they had done a good job, had they not? They had directed the greatest fleet the United States had ever possessed, and successfully, too; obviously, they had been trained well.

The younger officers were not sure about the value of sail. During the War the Navy, in Elting Morison's words, "had had a taste of the fruit of the tree of knowledge"[86] and had learned, among other things, that steamships were tactically superior to sailing ships. The older men, to continue the analogy, were able to renounce their transgressions; the younger, who had served in steamships before they became set in the ways of sail, had no memory of Eden to help guide them back to it.

One of the major arguments against the idea that the Navy had become totally reactionary and intellectually stagnant are the writings of some of the younger officers (and a few of their seniors, too) during the post-War period. Even VADM Porter stated that

> When we have a war, the question will be . . . who can longest keep the sea.[87]

although he stated later that only "by destroying the commerce of a great nation" could we bring her to terms.[88] Officers were at least thinking about the problems of naval strategy even though, operationally, the service had returned to the 1850's.

This operational regression is one of the main arguments against the idea that officers were "thoroughly familiar" with sea power. The Navy was deployed into four squadrons upon the return of peace in 1865; these were the European, Brazil, East India, and Pacific Stations.[89] By 1866 there were six stations: European, Asiatic, North and South Atlantic, and North and South Pacific. These squadrons remained roughly the same for many years, though the Pacific stations were at one time consolidated and then re-divided.[90] In 1860, before the War, there had been five stations, including a single Pacific squadron.

These squadrons were not squadrons in the modern sense of the term, which denotes a tactically-homogenous group of ships acting together. Though theoretically they were to operate together under a single command, in practice each ship cruised alone, and the squadron organization was primarily for administrative purposes. The squadron commanders directed the movements of their ships from a distance, and attempted to arrange cruises to touch at all important ports on the station — in 1871 the officer commanding the Pacific Station was proud to report that

> Every port of any importance, embraced in the limits of the fleet, has been visited at least once during the year, and in many cases more frequently.[91]

If a crisis were to arise, the squadron commanders' orders could be transmitted to their ships only with difficulty, and ships might arrive at the scene of trouble to find themselves the sole representatives of the United States.[92]

The detailed reports of squadron movements which appear in the Secretary's *Annual Report* each year show clearly this single cruising pattern. This practice placed a great deal of responsibility and authority in the hands of individual captains, and sometimes led to incidents such as that in which Captain Earl English, Commanding Officer of USS *Congress*, came very close to precipitating war with Turkey over an alleged insult to the American Consul in Tripoli. English had received orders which he had interpreted to mean that he was to proceed to Tripoli and exact ample reparation. He did so, threatening to bombard the town unless his demands were met. Acts of war (and the probable destruction of the *Congress*, a wooden ship) were averted only by the timely appearance of USS *Hartford*, which had by sheer luck arrived shortly before English's ultimatum was to expire. The combined force apparently frightened the Tripolitanians into agreeing to English's demands.[93]

This policy of single cruising gave to the wardroom officers much practice of the social graces, to the captains experience in diplomacy, and to the squadron commanders experience in high-level international politics. What it did not give to any of them were the skills essential to fleet operations — tactical planning, formation steaming, squadron battle drills, signalling, etc. The lack of these skills was conclusively demonstrated when the United States Fleet assembled at Key West during 1874, in response to a crisis between the US and Spain.[94]

Assuming that officers were aware of the concepts of sea power and that fleet operations would be necessary to implement them, and further, that officers were restrained from pressing for sea-control forces only because they knew that Congress would not appropriate the required funds, it would seem reasonable to suspect that squadron commanders might exercise their squadrons as tactical units, at least for a few weeks each year. It would be possible to carry out many of the evolutions and exercises under sail, making it unnecessary to use coal, and such squadron exercises could have been undertaken by individual commanders without requiring Departmental approval. In addition, no innovative thinking would be required — the tactics and signals had been developed during the War, and in 1872 the Navy had adopted COMMO Foxhall A. Parker's tactical manual.

There is no record of such maneuvers. It is suggested that the lack of such training, even after the 1874 fleet maneuvers had shown the need for it, indicates something less than thorough familiarity with all of the ramifications of sea power.[95]

The rejection and conversion of the *Wampanoag* class, on the other hand, indicates less than wholesale acceptance of the commerce-raiding strategy, since for many years thereafter there were no ships in the US Navy so well suited for commerce destruction as the *Wampanoag* and her sisters.

The commerce raider is designed to be able to overpower any ship which can catch her and run away from any ship which can overpower her. This means that the essentials of a successful commerce raider are high speed and moderately heavy armament; sacrifices must be made in other desirable characteristics to achieve these essentials.

In days when the range at which an enemy could be detected and identified far

In days when the range at which an enemy could be detected and identified far exceeded the effective range of the heaviest weapons, a ship which could outrun any ship possessed by any enemy had a tremendous tactical advantage as a raider — she could wait long enough to identify a strange ship positively, trusting to her superior speed to save her if the stranger turned out to be an enemy warship.[96] Isherwood had understood this, and had made the sacrifices necessary to achieve this superior speed.

The sacrifices had been made in the areas of storage space and crew comfort. These sacrifices would make little difference in time of war, but the world was at peace in 1868, and crew comfort and endurance meant more to a navy engaged in flag-showing peacetime missions than they had meant when the *Wampanoag* was designed.

Therefore, in 1869, the Secretary of the Navy appointed a board of officers to inspect the machinery aboard United States ships and to report on its condition. The Board on Steam Machinery Afloat, headed by RADM L.M. Goldsborough, was instructed to, among other things,

> Examine particularly into those new vessels, of the Wampanoag and smaller classes, in order to ascertain whether some of their boilers and smoke-stacks, and also other parts, such as superheaters, &c., cannot be dispensed with, and yet reserve to those vessels a fair speed under steam, on their being provided with full sail-power, and arranged to accomodate a sufficiency of coal and provisions; and whether there be any means of making these engines more direct-acting than some of them are now; and to make recommendations in regard to the proper disposition of the coal bunkers on board of the vessels in view, as the department believes that they have been very improperly placed, and so as to interfere with the comfort of their crews;
>
> Ascertain if all our steam vessels can be fitted with but one smoke-stack, and that telescopic; or, where this is impracticable, if all the flues cannot be turned into one standing smoke-pipe, which will be clear of the main-sail when the ship is under sail, and to make recommendations on the subject;
>
> Keep in view, in suggesting alterations, that it is very desirable to improve the quarters of officers and men; . . .[97]

It is reasonably evident, upon examining these instructions, that a condemnation of the *Wampanoag* class was both expected and desired. The Goldsborough Board was the line officers' move against the materiel of the Engineer Corps, as they had already dealt with the personnel; in short, they created a "hanging jury."

The impression one receives of a hanging jury is heightened by the criticisms on which the Board based their condemnation of the *Wampanoag*. Some were valid but beside the point; some were, at best, partially valid but easily remedied; many had already been proven

incorrect during her sea trials. The Board's principle objections to the ship were, in summary:

Marine design: The ship was too long to be rigid, and would be subject to be strained in a seaway; also, her great length would make her unhandy.

Engineering plant: The ratio of area of grate surface in the boilers to immersed sectional area (at the waterline) was 1.53 to one, whereas in contemporary ships the rule was to have roughly the reverse ratio; that is, have the immersed section 1½ times as large as the grate surface. *Wampanoag*'s four-bladed screw and small show of keel would nullify the use of canvas independently, and the placement of masts and sails was poor. The boilers were vertical water-tube boilers instead of the conventional fire-tube types, and the superheaters, of Isherwood's design, were "nothing less than an expensive failure."

Gunnery: The weight of battery was "insignificant" for a ship of her size, and there were not enough guns mounted to give sufficient ahead and astern fire.

Habitability and stowage: The ship could only stow provisions for a full crew for 2½ months, and coal for only five or six days at "maximum work". There was insufficient space for chain cables for mooring, and only one-third the fresh-water tank capacity necessary. Accomodations for officers and men were "strikingly confined", and in warm climates might prove "almost uninhabitable".

On the bases of these criticisms, the Board condemned the ship utterly, saying

> Although the *Wampanoag*'s arrangements may be modified as just stated, yet in truth but little will be gained by it, considering the expense that will have to be incurred, and, above all, the condition in which she will be left. It is, in short, utterly impracticable to render her a vessel of war worthy of our Navy. Her case is so bad as to be beyond cure . . .[98]

Examining the Board's criticisms, however, leads to the opposite conclusion. For a start, the problems of longitudinal stability and seaworthiness, and of steering, were simply not problems, it having been proved on her trials that she was seaworthy and easy to handle (see above).

The argument about grate surface was specious, since the ship performed well. Comparing her with other ships, which had not been built for speed, was like comparing apples and oranges. The argument about speed under canvas alone was ridiculous, it having been proven also on her trials that the ship handled reasonably well under sail alone. The placement of the masts was indeed not the optimum, since the masts had been considered

secondary to the steam plant, and the ship did not have, and was not intended to have, full sail power — i.e., 35 square feet of sail area for each square foot of immersed midship section.[99] The vertical water-tube boilers were supposedly more prone to breakdown and more difficult to fix than the horizontal fire-tube model, but the British and French were even then experimenting with them. The superheaters were apparently condemned because of their design being by Isherwood, as the Board suggested later in their report that certain ships, notably the monitor *Dictator*, be fitted with "a superheating apparatus, thereby increasing their economy in the combustion of coal."[100]

Since the *Wampanoag* was designed to run away from warships rather than to fight them, her battery was heavy enough to serve her purpose. Forward fire was then in vogue as an adjunct to ramming tactics, but the *Wampanoag* was not meant to ram anything on purpose, so it made little difference whether or not she could deliver heavy fire over the bow.

The ship was admittedly cramped. It must be remembered that the *Wampanoag*s were not intended to operate alone for long periods; they were to refuel and resupply from their captures. The matter of the coal supply was more important, but the Board again showed a talent for irrelevant argument — at maximum speed the average foreign ship had no more endurance than did the *Wampanoag*, and the Board noted that, at economical cruising speed (twelve knots) the ship used less than one-third the coal that she used at "maximum work".[101] It is admitted that the lack of foreign coaling stations was an argument in favor of US ships having superior coal endurance, but the Board did not make this point and expected that most cruising would be done under sail in any case.

The two line officers on the Board combined with the civilian member, who disliked Isherwood, to condemn the ship ringingly. The two engineer members, also of the anti-Isherwood faction, condemned the ship somewhat less severely. In any case, *Wampanoag*, her name changed to *Florida*, remained laid up until 1875, when she became a receiving ship. She remained so until she was sold in February 1885; *Ammonoosuc*, renamed *Iowa*, was laid up soon after her trials and sold in September 1883.[102] The other ships of the class met a similar fate.

It has been argued that, since the US was at peace, there was really no need for such a

ship, built only for war. This argument meshes with the idea that, in the Nineteenth Century, peace was a positive thing, and not merely a state of non-war. The resultant idea may be stated, in simplest terms, thus: Since the United States did not, in fact, engage in war during the period between 1865 and 1890, the leaders of the day did the economical, justifiable, and sensible thing by allowing the Army and Navy to deteriorate. This line of reasoning is often supported by arguments demonstrating the security of the United States and the lack of enemies able to make their presence felt in the Western Hemisphere.

Such arguments ignore the real state of affairs during the 1870's and 1880's. In particular, they ignore Spanish presence in Cuba, over which relations between the US and Spain had been strained since the 1850's. Allan Nevins' biography of Grant's Secretary of State, Hamilton Fish, makes it clear that the Spanish-American War almost began in 1873 over the capture of the *Virginius* rather than in 1898 over the sinking of the *Maine*; only good luck and good management averted war. Had there been a war, the naval positions of the US and Spain would have been the opposite of those which the two countries occupied in 1898 — the US, with its fleet of aging monitors and cruisers, would have faced a difficult task to contain the relatively modern Spaniards.

The "naval maneuvers" of 1874 showed the real condition of the US Navy. When the Spanish apologized and the war threat was over, the Navy Department took advantage of the opportunity presented by the concentration of the fleet at Key West to conduct maneuvers. In the words of COMMO Foxhall Parker,

> The greatest speed that could be maintained by the fleet *as a unit* [italics author's] was four and a half knots an hour . . . What could be more lamentable . . . than to see a fleet armed with smooth-bore guns, requiring close quarters for their development, moving at the rate of four and a half knots an hour? What inferior force could it overtake, or what superior one escape from, of any of the great naval powers of the earth?[103]

It is also interesting to note the different handling of the monitors and of the *Wampanoag*. The monitors were laid up in fresh water, and at least some of them had their machinery preserved with oil and oil baths.[104] The *Wampanoag*, like the monitors purely a ship of war, was laid up for years at New York and then made a receiving ship; her machinery was allowed to rust.[105] It would seem that allowing the fast cruisers to deteriorate was not the result of a policy of economy or general unpreparedness, but of the prevailing prejudice against steam.

Besides the line/engineer controversy, though, there were other impediments to naval progress. The major factors may be divided into areas within the service and outside it. From within the Navy was held back by political corruption and an archaic system of promotion. From without, the national economy, technological change, and the insular position of the United States helped to divert attention from the Navy.

Political corruption became widespread during Grant's Administration. This was partly attributable to the wide-open nature of the economy, but resulted more from Grant's lax supervision of his appointees and his poor judgment of character. The nation as a whole was rocked by scandals such as the Credit Mobilier case, which involved Vice President Schuyler Colfax, the Whiskey Ring affair, which involved Grant's private secretary, and the cases which resulted in the resignation of a Secretary of the Treasury and of a Secretary of War to avoid prosecution. The Navy was not exempt from stains.

Most of the corruption in the Navy Department stemmed from the Secretary's Office. As mentioned above, Grant selected his Cabinet officers on a personal basis. Hamilton Fish was worried by

> Grant's natural friendliness to many people intellectually and morally below him, to all hail-fellows-well-met, and to everyone who pretended an enormous loyalty.[106]

and it seems to have been Robeson's personal charm and his party loyalty which gained him the Navy post.[107]

The loyalty of men to political parties was pursued to an extent practically extinct today, to the point were loyalty to party came well before loyalty to country. The Navy Department, with its numerous shore establishments, was a good means of distributing patronage, and many men were given jobs for a few weeks before and after Election Day in order to ensure their Republican loyalty. It has been estimated that over $1 million of the Navy's annual budget (which averaged $18 million during the 1870's) was used in the corruption of elections.[108] Since the workmen thus hired were totally unacquainted with marine construction and repair, they were employed on such makework jobs as moving timbers from one side of a yard to the other and back again.

There is evidence that naval officers acquiesced to some of this corruption. Several, including two Chiefs of Bureau, were censured along with Robeson in the report of the

House investigating committee in 1876.[109] It has not been proven that these officers ever received any personal graft from Robeson's activities. It is suggested that the motives of these officers in agreeing to Robeson's illegal contracts (see below) were the same as those which governed German officers of the 1920's in their (illegal) rebuilding of German armed forces.

Robeson diverted money appropriated for repairs to existing ships to the construction of new ones. Congress had to authorize the building of new vessels, however, so the fiction was maintained that the new ships were simply the old ones, repaired. Among the contracts for "repairs" were those for the reconstruction of the five monitors of the *Puritan* and *Miantonomoh* classes, which was begun in 1874.[110] These ships were parceled out to various yards, where repairs proceeded fitfully as the Department obtained additional increments of money.

Since the appropriations for the Bureau of Construction and Repair and the Bureau of Steam Engineering were barely sufficient to maintain the ships of the existing Navy, let alone to build new ships at the same time, corners had to be cut. In general, the Navy concentrated on keeping a few of the best ships in repair and leaving the others to rot, and using the money thus saved to pay for the new ships. In addition, Robeson traded some of the older monitors to contractors as scrap metal, in return for credits on the new-construction monitors.

Most of this activity was illegal. In 1868 Congress had authorized the Secretary of the Navy to sell any of the monitors except the latest and strongest classes, but the authorization included the provision that the funds obtained from these sales were to revert to the Treasury, not to the Navy Department. Other legislation provided that an agency of the government could not enter into contracts without having the funds appropriated, at the time of signing the contract, to cover the amount of it. Both of these laws were disregarded. In addition, the faction that the new ships were "repaired" versions of the old ones were patently ridiculous; for instance, the *Miantonomoh* was supposedly being repaired by John Roach in his Chester, Pennsylvania, yard, but the old *Miantonomoh* was broken up at the Boston Navy Yard.[111]

Similar contracts were made for the "repair" of several older wooden vessels, from

which emerged entirely new wooden cruisers. Robeson apparently received his "percentage" on these jobs, and the storm which broke when the House Naval Affairs Committee investigated the Navy Department in 1876 would probably have resulted in Robeson's impeachment had not the dispute over the Presidential election occupied Congressional attention.

There are two interpretations of Robeson's acts. One, presented by Frank Bennett in his book, *The Steam Navy of the United States*, is that Robeson acted from high motives to arrest the decline of the Navy in spite of Congress. It is true that without his illegal contracts, the Navy would have reached bottom somewhat sooner. The other is that Robeson was primarily interested in business for the contractors and a rake-off for himself, and that the improvement in the Navy was incidental. It is suggested that Robeson found it easy to placate both the faction within the Navy which was pressing for new ships and the contractors who wanted business.

The second factor operating within the service, though imposed by Congress, was the policy of officer promotion. During the Nineteenth Century, and indeed until 1916, officers were promoted strictly by seniority — if one kept one's record clean and lived long enough, one would eventually advance. This tended to stifle initiative, as there was no difference in the rate of advancement for those who shone and those who did the barest minimum necessary to get by.

The alternative systems were "plucking", which would remove less-efficient senior officers so that their juniors could advance (by seniority), and promotion by selection, based on merit. Both of these systems had powerful foes. Plucking was opposed by the most senior and influential officers — i.e., those who stood in the greatest danger of being plucked. Promotion by selection, in those days, offered too much chance for undue personal or political influence upon an officer's career.

During the years after the War Between the States, the promotion system was clogged with the graduates of the wartime classes, those of 1864 through 1868. The situation was aggravated by the fact that the many officers who had received a vote of thanks from Congress for gallantry could not be retired without their consent unless they committed a felony or amassed 55 years of service; other officers could remain until age 62 or until they

had completed 40 years of service.[112]

There were simply too many officers for the size of the Navy. In 1877, for example, there were a total of 1699 officers on the active list, plus 249 warrant officers. At the same time, there were 7012 enlisted men and boys — an enlisted/officer ratio of 3.6/1.[113] The remedies applied by Congress during the 1870's took the form of curbs on the rank and status of junior officers rather than of clearing out the clogged upper grades, and caused much unrest among junior officers. Those newly-graduated from the Academy suffered most, as each year more officers were added than there were vacancies created by death or retirement. Thus, promotion became slower with each passing year.

The national economy was also a factor in naval decline. From 1866 on, every year showed a federal budget surplus with the sole exception of fiscal 1874. This surplus ranged from a miniscule $100,000 in 1866, just after the War, to as high as $145.5 million, in 1882. During the years of Grant's Presidency, despite the depression which followed the Panic of 1873, the surplus averaged $56 million per year.[114] Though a considerable debt still remained from the War Between the States, it had been re-funded by 1871, and was a problem only in that Congressional miscalculation had made it impossible to pay off the debt before it became due. The money for shipbuilding was available throughout the post-War era.[115]

Most of the nation's financial attention during this period was focused on speculation in the West and on the growing friction between creditor and debtor classes over "sound money" versus "cheap money", and there was little attention to spare for the close supervision of naval finance. Then as now, however, it was easy for Congressmen to gain popularity with their constituents by posing as champions of economy in government, and the military budget was an easy place to make highly visible sacrifices.

There were not nearly enough ships in the Navy to justify the maintenance of eight navy yards, but Congressmen from seaboard states would far rather vote for yards than for ships, the latter not benefiting their constituents directly. (A modern parallel may be seen, for example, in the uproar in Maine when it was proposed, in 1971, to close the Portsmouth Naval Shipyard.)

In the private sector of the economy, there were opportunities enough domestically to

obviate the need for overseas markets. The American West presented many opportunities for speculation, and, indeed, the "railroad boom" lasted through 1881. As ADM Porter said in 1874,

> The people of this country are so deeply immersed in business and politics that they give little attention to the necessities of a navy . . .[116]

The Panic of 1873 slowed western exploitation for a time but did not stop it, though the depression which followed the Panic lingered for several years. It is also noted that the panics in the private sector (that of 1873 and the much milder Panic of 1869) brought pressure for reduced federal spending in their aftermaths.

A major restraint upon Congressional naval appropriations was the rapid technological change exhibited by naval architecture during the years following the War Between the States. An advisory board created by the Secretary of the Navy in 1881 stated that

> It is the experience of foreign navies up to the present time that any type of iron-clad vessels introduced becomes so inferior as to be almost obsolete for general purposes in a period of about ten years.[117]

and further, regarding artillery,

> that almost all rifled guns constructed prior to 1878 are now so inferior in power as to be considered unworthy of further construction.[118]

These conditions were even more extreme during Grant's Administration, as by the early 1880's naval development was beginning to slow down a bit.

This rapid obsolescence meant that maintaining a modern ironclad fleet was an extremely expensive proposition. It was considered by many, especially Congressmen, that the US should simply observe until European designers had achieved the perfect, or near-perfect, ship, and only then begin to build. Not only would this course of action result in better ships eventually, said its proponents, but meanwhile it would save money.[119]

Thus, while the Royal Navy experimented with broadside battery ships, turret ships, breastwork monitors, casemate-battery ships, central-citadel ships, barbette ships, and barbette-turret ships, the US Navy observed. This probably spared the US Navy such incidents as the capsizing and foundering with all hands of HMS *Captain*, which resulted from attempting to combine a low-freeboard, low-stability design with full sail power, and undoubtedly saved the US large amounts of money. However, when the United States finally decided to rebuild its navy, it found that the skills and plant needed for heavy

warship construction were entirely lacking, whereas the British had gained proficiency in the hard school of experience. This British know-how enabled them to build ships in half to two-thirds of the time required to build similar ships in American yards.[120]

The most powerful argument for a small Navy, however, was that which stressed the isolation of the United States and claimed that isolation meant that a navy was a luxury. Secretary Robeson stated, in his last *Annual Report* (1876) that

> . . . for the defensive purposes of a peaceful people, without colonies, with a dangerous coast, and shallow harbors, separated by a vast ocean from warlike naval powers, our Navy is not without strength . . .[121]

and he stated points which were to be offered in most naval appropriations debates which were to occur during the late Nineteenth Century.

The idea that the United States was a peaceful nation was firmly entrenched in popular mythology, though it would appear dubious in light of past performances. The US did not need a sea-going Navy, the small-Navy faction argued, as had a similar faction during the early 1800's, and such a sea-going Navy would only encourage the government to meddle in affairs which did not concern it. (The idea of the US being a peaceful nation and the idea of the nation's leaders being unable to resist involving the nation in foreign struggles were usually put forth by the same people.) A maritime police force was quite enough, they said; if the US were to be drawn into a war, albeit reluctantly, a naval force could be improvised readily enough.

The United States was a second-rate power, despite the claims to the contrary made by patriotic orators. There was no need for a Navy "second to none" or "second only to Great Britain" — the country was self-sufficient, had no colonies to defend, no position to maintain. The US did not need a Navy to help it to keep up appearances.

the prevailing idea among the small-Navy men was that coastal fortifications and the character of the American coastline itself would be sufficient to deter foreign fleets. The coastal fortifications, however, dated from the pre-War Between the States period. They were large, highly-visible masonry structures, armed with old-style weapons, and were highly vulnerable to naval gunfire from advanced contemporary naval guns. Attempts were made in the early 1870's to modernize the system of fortifications, but nothing serious was done until the late 1880's. ADM Porter declared in 1874 that "a single iron-clad frigate could

blockade our shores from Maine to Texas, and he was essentially correct.[122]

The argument of distance has great logic to it. Before the advent of oil fuel, cruising ranges were insufficient to allow a fleet to conduct sustained operations far from its bases. However, the argument loses much of its force when it is noted that the nations with whom United States relations were often or historically strained, i.e., Spain and Great Britain, both possessed bases in the Western Hemisphere. In addition, the Latin American nations, particularly Chile, Argentina, and Peru, maintained ironclads which could have successfully fought any ironclad in the US Navy, and relations between these countries and the US were not always cordial.[123]

The American naval landscape was not entirely featureless. A few ships were built during the Grant Administration; they were, for the most part, reasonable examples of their types – but their types were obsolete.

The first vessels built were six cruisers, built of wood, which were "repaired" (i.e., rebuilt) in the same fashion as were the monitors mentioned above. They were begun in 1871 and 1872.[124] In early 1873 Congress authorized eight warships, specifying that the total displacement of all eight should not exceed 8000 tons.

These eight ships were of mixed design. Three were the *Alert* class of 1020-ton iron-hulled gunboats, armed with rifles made from Dahlgren smoothbores, Parrott rifles, and howitzers.[125] These were excellent ships, well built but obsolescent before they were laid down. The *Enterprise* class, of four ships, was slightly larger and similar in design but built of wood and armed with smoothbore Dahlgren weapons. They, too, carried full sailing rigs, and were even less up-to-date that the *Alert* class.[126] The gunboat *Nipsic* was rebuilt as an *Enterprise* class ship.

The eighth ship went beyond the idea of gunboats. USS *Trenton* was for many years the finest ship in the US Navy. Since she was essentially a wooden frigate with full sail power, armed with converted Dahlgren rifles, her comparative excellence is another dismal example of American naval decline. At this time, European nations were building battleships against which *Trenton* would have been totally powerless – unable either to escape, to protect herself, or to injure her enemy.[127]

There were some progressive aspects to US naval technology. As early as 1871, ADM

Porter had said

> In . . . heavy rifled guns, we are singularly deficient, and it is with these that every foreign fighting ship is armed. Our smoothbores are in many respects behind the age, and only valuable against forts or wooden vessels.[128]

The situation was recognized, at least, and the Bureau of Ordnance worked hard to alter it, but little could be done immediately — as Porter stated, "We cannot, at present, make rifled guns in this country."[129] There were no US steel mills capable of producing the extremely large, high-quality forgings required for the manufacture of heavy weapons, and no money available to the Bureau to foster such mills.

As an interim measure, within its budget, the Bureau converted XI-inch Dahlgren smoothbores into 8" rifles by inserting rifled sleeves into the barrels. In 1875, the Bureau reported

> If we are to keep pace with other maritime nations, the necessity of a general re-armament of our ships with rifled cannon is evident. . . . Although we can convert the 11-inch pivots into powerful muzzle-loading rifles for upper decks, they are by no means so efficient as new guns specially designed for the purpose, while for broadside guns . . . breechloaders are indispensable.[130]

American officers continued to experiment to the limits of their money and facilities, and retained a sensitivity toward innovation, but they also observed progress in Europe and saw that they were outclassed.[131]

The Bureau also worked on the development of the torpedo, using first the spar torpedo and then the "automobile" or "fish" variety. The Torpedo Station had been established at Newport, Rhode Island, in 1869, and by 1876 had trained over 150 officers.

Further, the Naval Institute had been founded in 1873, and the first number of its *Proceedings* was issued in 1874. The Institute provided a forum for professional ideas, and much can be discerned about the professional preoccupations of naval officers by examining the articles appearing in this journal.

These gleams of light served mainly to illuminate the relative inferiority of the major part of the Navy when compared with foreign establishments. In his final report in 1876, Robeson claimed that

> . . . our Navy is now, in the character and condition of its ships and material, in a condition far superior to that in which it was in 1869, and indeed far more powerful for our warlike purposes than it ever had been before in time of peace.[132]

but this was political bluster. The state of the US Navy was recognized even by laymen — in

one of Oscar Wilde's plays, an American lady who bemoaned her country's lack of curiosities and ruins was told, "Well, you have your manners and your Navy."[133]

Benign Neglect: The Hayes Years, 1877-1881

Rutherford B. Hayes became President of the United States by the margin of one electoral vote, after a disputed election which required a special Congressional committee to decide between rival sets of electoral returns. He took office pledged to civil service reform, sound money, and an end to sectional bitterness, and he promised not to seek re-election in 1880.[134] Hayes named Richard Thompson of Indiana as his Secretary of the Navy, a purely political appointment.[135]

There was little apparent change in the Navy during the Hayes years. The ships begun during Grant's terms were completed, with the exception of the monitors, but no new ships were commenced. The preoccupation of Congress with other matters was the main reason; a secondary reason was the character of the Secretary.

In Congress, the late 1870's were a period of attention to fiscal policy, in an attempt to end the lingering depression which had begun with the Panic of 1873. Hayes' attempts to reform the civil service and his decision to end the military coercion of the South provoked bitter battles between the "Stalwarts", as the old Radical Republicans had come to be called, and the Democrats and Liberal Republicans.

The Democrats controlled the House of Representatives throughout Hayes' term, and controlled the Senate from 1879-1881. Since party spirit was so strong, it was difficult for either President or Congress to propose new programs, as the party in the minority would seize any controversial legislation and attempt to make political capital out of it. Secretary Thompson was not a man willing or able to pressure either President or Congress.

Supposedly, Thompson expressed surprise upon learning that ships were hollow.[136] Despite his ignorance, he stated in his first *Annual Report* in 1877 that, "the Navy . . . should not be kept in its present condition of inferiority."[137] and went on to say that

> The least that should be done is that already suggested, to put the ships we have in as perfect

> condition as they are susceptible of, and gradually hereafter, when the revenue shall be sufficient to justify it, build other ships, of such classes and styles of construction as our own and the experience of other nations shall warrant.[138]

He noted, however, that

> Heavy, armor-plated, gun-bearing vessels are not capable of sea-service. They are suited for little else than harbor defense, and may be likened to movable fortifications. [139]

He apparently retained this prejudice against armored ships, as he said in 1879 that, where the US had adhered to old types of ships, European powers

> . . . have introduced new ones, supposed to combine these qualities [speed, attack, and defense] in a greater degree than has hitherto been reached. *But whether in these respects they have surpassed us, and if so, to what degree, remains an open question.* [italics mine] [140]

Besides having to deal with the ever-deteriorating physical condition of the Navy, Thompson had to cope with a new strategic imperative – a Central American canal. Such a canal, which would reduce the distance from San Francisco to New York by sea from 13,000 miles to 6000 miles, would at once be a great asset and a grave liability to the United States.

On the one hand, it would enable the country to defend both of its coastlines with a single fleet. On the other, if an enemy were able to destroy the canal, or an enemy or a neutral were able to bar US ships from passing through, the US might be caught with the halves of its fleet separated by 13,000 miles of ocean and thus liable to be destroyed in detail.

This latter meant that, if there were to be an Isthmian canal, it was essential to US national security that the United States both control the canal and be able to defend it. The task of defense, in turn, meant that the United States must be able to maintain undisputed control over the Caribbean Sea and the eastern Pacific Ocean.

Many attempts had been made to construct or to discover an Isthmian canal, dating practically as far back as the Spanish discovery of the Pacific Ocean. All attempts had failed. By the late 1870's, however, technology had progessed to the point of making such a canal a distinct possibility. A French company, headed by Ferdinand de Lesseps, began operations aimed at building a canal in Colombia. de Lesseps' reputation as the builder of the Suez Canal meant that this enterprise had to be taken seriously.

Hayes invoked the Monroe Doctrine and stationed warships off Colombia to induce the

Colombian government to agree to solely American control over the proposed canal.[141] Colombia refused, demonstrating that the Monroe Doctrine meant little without power with which to back it up.

By this time, the officer corps was almost solidly in favor of expanding the Navy, but the solidity disappeared when it came to deciding what form naval expansion should take. One faction advocated building European-style heavy armored ships; another felt that armored ships were necessary in the future, but not just then; another wanted monitors with the addition of contemporary armament; others advocated different types and combinations of cruisers, torpedo boats, and rams. This lack of professional unanimity aided Congressional opponents of naval expansion; they felt, quite reasonably, that if even the professionals could not agree upon what types of ships the United States needed, the best course was to wait until the professionals did agree to build anything.

Among the strongest supporters of an enlarged Navy was Admiral Porter. It must be made clear that his views about the superiority of the line to the staff, and about the utility of full sail power, did not change; however, he was first, last, and always a Navy man. His reports to the Secretary of the Navy show that he began to disagree with Robeson in the early 1870's,[142] when it became clear that Robeson could not or would not maintain an effective Navy. By the end of Robeson's term as Secretary, Porter was differeing sharply with Robeson's optimistic statements about the Navy's condition. (It is interesting to note that no report from Porter appears in the 1876 *Annual Report* in which Robeson made the statements quoted above.)

Porter is a contradictory figure. In his report of 1875, he stated that the power of a Navy was ". . . in its ships of the line, and not in its smaller vessels."[143] and said that

> No matter how many wooden vessels, with fair batteries, we may possess, they add nothing to our fighting force except against light-armed ships like themselves and merchant-vessels . . .[144],

He proclaimed that

> For fighting purposes I prefer turreted vessels, of the monitor class, to any others . . . we started on the right plan for coast-defense, and should now perfect it . . .[145]

indicating that, despite his preference for "ships of the line", he still thought of the primary purpose of the Navy as coast defense.

At about the same time, he was staunchly behind wooden ships, full-rigged, for cruising. He wrote that ". . . . without a proper combination of both elements [steam and sail power] no vessel is fit for cruising," – but that

> While we are building new ships we are not advancing in the matter of speed, the great requisite of a cruising ship of war, and we should, therefore, neglect nothing that will add to the sail power or secure a happy combination of steam and sail when occasion may require.[146]

Porter repeatedly urged new construction and emphasized the low state to which the Navy had fallen. Meanwhile, Thompson preferred to devote his attentions to the merchant marine[147] and to his own private business, leaving the Department to drift.

In 1880, Thompson, apparently not appreciating the conflict it made with his country's policy, accepted the chairmanship of de Lesseps' Panama Canal Company. Hayes finally made public comment disapproving of this action, and Thompson resigned on 20 December 1880. Nothing further happened in the Navy until the new Administration was inaugurated, though Hayes did appoint a replacement for Thompson.

Thompson's major contribution was the elimination of the worst of Robeson's extravagances, particularly the illegal making of contracts and illegal disposal of government property. (One of the first things Thompson did as Secretary was repudiate contracts Robeson had made on the last day of Grant's term, which transferred more of the old monitors to shipbuilders in payment for work done on the *Miantonomoh* class.) Thompson also had some success in curbing political corruption in the navy yards, as an 1880 observation in the Naval Institute *Proceedings* indicates:

> I would recommend that the complete control of the navy yards, even to the exclusion of local politicians, should by law be given to the naval officers in charge . . . the spectacle of a large increase in the working force prior to elections and the discharge immediately after, happily not visible during the present administration, but so common in former days, would be avoided.[148]

Overall, the Navy declined further under Thompson. Perhaps, had Thompson been worthy of the President who appointed him, the first steps toward the "New Navy" might have been taken in 1879 rather than 1882.

First Steps Towards the New Navy: 1881-1882

Before beginning a discussion of the Navy during the early 1880's, it is necessary to attempt to resolve the question of precisely when the New Navy was begun. In retrospect, at least, there are several possible answers:

The year 1881 is a possibility because the accession of Garfield marks the end of "the cycle in which our politics turned upon the Civil War and its immediate consequences."[149] The Hayes Administration had dealt with ending Reconstruction and alleviating the depression of the 1870's. The Republican Party controlled the Presidency and both Houses of Congress, the first time in six years that a single party held all three. Congress and people were beginning to turn their attention from internal matters to foreign affairs. "The process of naval reconstruction was commenced in that year."[150]

The naval appropriations Act of August 5, 1882, marks that year, too, as a milestone. Besides attempting to deal with the promotion pile-up, the Act of August 5 decreed that no money should be spent to repairs to any wooden ship if the repairs would cost more than 30% of the cost of building a similar ship, and also authorized two steel cruisers and empowered the Secretary of the Navy to appoint an Advisory Board.

The next year, 1883, looks also like a plausible date from our vantage point, as in that year Congress authorized construction of four new warships and appropriated the money for them.

Grover Cleveland was inaugurated in 1885, and his attitude and that of his Secretary, William C. Whitney, were favorable. Whitney prodded Congress into agreeing to long-overdue reforms in the organization of the Navy Department, and the Navy was authorized 30 ships during the Cleveland Administration.

America's first modern armored warship, USS *Maine*, was laid down in 1888. USS *Texas*, the Navy's first modern battleship, was laid down in 1889, and in that year the Squadron of Evolution was formed. The *Indiana* class, the first American battleships to compare favorably with European ships, were begun in 1891. And, as late as 1896, one prominent author stated,

> . . . the New Navy is still so far from finished that any detailed account of all that has been accomplished thus far would of necessity be but the beginning of an incomplete story . . .[151]

and went on to say that

> . . . there is every reason to hope that the reconstruction work so well begun will be carried on . . .[152]

From these contradictory, or complementary, dates, 1882 has been chosen as a convenient turning point.

Returning to the beginning of the Garfield Administration in 1881, it is pointed out that the major issues of the 1870's (Reconstruction, internal expansion, the national economy) were fading from national consciousness. The Southern states had all returned fully to the Union. By 1881 the last of the transcontinental railroad projects was finished, and the West was no longer the speculator's paradise it had been. Export trade had grown from $502 million per year in the early 1870's to $792 million in the early 1880's,[153] despite the depression of the 1870's.

Technologically, things were just beginning to stabilize. The 1880's and 1890's were years of refinement rather than revolution, and as this became obvious during the 1880's Congress became gradually less afraid of wasting money on ships which would soon be obsolescent. Most of the characteristics of the "mixed-battery" battleships of the 1890's and early 1900's had appeared in one form or another by 1881 — iron or steel frame and plating, heavy breech-loading rifled ordnance, compound or triple expansion reciprocating engines, double-bottomed and compartmented internal arrangements, etc.[154]

The first significant naval action of the Garfield Administration was the creation of an advisory board by Secretary William H. Hunt. This board was instructed to

> . . . consider and advise the department upon the following subjects:
> 1st. The number of vessels that should now be built.
> 2nd. Their class, size and displacement.
> 3rd. The material and form of their construction.
> 4th. The nature and size of the engines and machinery required for each.
> 5th. The ordnance and armament required for each.
> 6th. The appropriate equipments and rigging of each.
> 7th. The internal arrangements of each, and upon such other details as may seem necessary and proper, and, lastly, the probable cost of the whole of each vessel when completed and ready for service.[155]

The Advisory Board, headed by RADM John Rodgers, made its report in November, 1881. It surveyed the currently available ships and discovered that, excluding sailing ships, tugs, etc., only 32 cruising ships could economically be made serviceable. Examing the

duties for which cruisers were needed, the Board concluded that 43 cruisers were the minimum needed for the peacetime Navy. European practice took into account the necessity of making allowance for ships under repair by adding a 50% reserve force, and the Board concurred, making the required number 65. The Board further noted that several of the ships then in service would not last many more years, and allowed for these anticipated losses by raising the total to 70 cruising ships. Since 32 ships were available, 38 had to be built.[156]

The Board went on to reccomend several classes of ships, designated by speed and tonnage: two 15-knot, 5873-ton; six 14-knot, 4560-ton; ten 13-knot, 3043-ton; and 20 ten-knot, 793-ton vessels. The three largest classes were designed for their speed and general utility, the small ten-knot class for its shallow draft.[157] The Board also recommended building five "marine rams", five torpedo gunboats, ten cruising torpedo-boats, and ten harbor torpedo-boats.[158]

A controversy arose over the Board's specification of materials for these ships. The majority of the Board recommended steel as the material for the large cruisers, the rams, and the torpedo boats, and wood for the ten-knot cruisers. Their reasoning about the former group of ships was that steel was stronger than iron, and therefore parts made of steel required less material to achieve the same strength and rigidity than similar parts made of iron. The additional cost of steel over iron would be offset by the smaller amount required. The majority noted other advantages, and observed

> . . . the certainty that steel is in the very near future to almost entirely supplant iron in the construction of vessels. [159]

The case for using wood in the ten-knot class of cruisers was not based on technical considerations, however:

> It is the opinion of the Board that owing to the large supply of suitable timber at present on hand in the navy-yards, which the interests of economy demand should be utilized, the familiarity of our eastern workmen with wooden ship-building, and their dependence upon it for a livelihood, the resources of the country with respect to this material, and the possibility of building wooden vessels of a limited size that shall be staunch, efficient, and economical, the 10-knot class of vessels should be built with live-oak frames, planked and cieled with yellow pine.[160]

The minority report, signed by Naval Constructor John Lenthall, Chief Engineer Isherwood, and two others, took exception to certain points of design and construction. Its

major point was an argument in favor of iron rather than steel for the larger cruisers, which was based upon various opinions regarding the relative merits of the two materials, most of which opinions proved incorrect.[161]

The Board did not propose to build any "iron-clads" for several reasons, including the lack of need for them in peacetime, the probable reluctance of Congress to authorize such expensive ships, and technological uncertainty.[162] This last included armament, for, though the Board approved of heavy steel breech-loading rifles, at the time no firm in the country could manufacture large-caliber steel guns, and the Board did not think Congress would permit foreign purchases.[163]

However, the Board stated that

> *Such vessels are absolutely needed for the defense of the country in time of war*; and if Congress be willing to at once appropriate the large sum necessary for their construction, thoroughly efficient vessels can be designed and built in this country.[164] [author's italics]

This report was representative of the then-prevailing ambivalence among US naval authorities. On the one hand, the Board endorsed the use of steel and noted the need for building up a navy during peacetime as an insurance in time of war. On the other hand, the majority endorsed the use of wood for hulls, called for retention of full sail power, and remained principally adherent to the concept of a peacetime Navy.

The Board noted that

> . . . one of the pressing necessities of the present time is to provide as far as possible for an efficient naval defense for the coasts and harbors of the country in case of a sudden emergency.[165]

They recognized the conflict between this statement of urgency and the statement quoted as note 164 above, and advocated a force of rams and torpedo-boats to hold foreign fleets in check "until armored defense could be provided"[166] — which provision might take considerable time, as it was also noted that heavy ordnance manufacture in the United States ". . . for some time to come will be too uncertain to warrant any recommendation by the Board . . ."[167]

ADM Porter, meanwhile, was proposing nothing less than the building of an armored fleet, with ships as up-to-date as any in the world. He stated that, in addition to the ironclads the US already had, it was necessary to have twelve steel-armored ships of 9000

tons each, having reasonable speed and at least eight breech-loading guns "not less than 38 tons rifled", twelve iron steamers (similar to the 15-knot class proposed by the Advisory Board), eight 4000-ton monitors, and 20 torpedo-boats. He made it clear, though, that these ships were for coastal defense only.[168]

These reports were sent to Congress with the Secretary's *Annual Report* for 1881. After passing through Congress the 68 ships proposed by the Board had been reduced to two, one each of the 15-knot and 14-knot classes of cruisers, but no funds were appropriated for construction.

The other portions of the Act of August 5, to wit the 30% provision, the promotion reform, and the statutory Advisory Board, had much more impact upon the service.

The 30% provision was an excellent start towards naval reconstruction. There were ships on the Navy List which had consumed far more money for repairs than they had cost originally — *Kearsarge* was one such; her original cost in 1861 had been about $287,000 and she had had about $1,123,000 worth of repairs by 1875; *Ossipee* originally cost $407,000 in 1861, and had used up $1,197,000 by 1884 — and the Navy was far better off without these ships. The number of cruisers in "serviceable" (i.e., operable or repairable) condition had dropped from 58 in 1881 to 32 in 1884.[170] However, nothing was authorized to take the places of these ships in the Act of August 5 other than the two steel cruisers.

The promotion snarl was to be attacked in a number of ways. First, admission to the Academy was restricted, and a limit was placed upon the number of graduates who could be commissioned each year. Second, the promotion ladder was lengthened by reducing the rank of midshipmen at the Academy to "cadet midshipmen"; upon graduation, each man faced two or three years of service with the fleet in the grade of "midshipman" before it would be decided which of the members of the class would be lucky enough or able enough to gain an ensign's commission. Third, the Act fixed the maximum allowable number of officers in each grade, at a figure well below that which then existed, and required that, in order to promote an officer, two vacancies had to exist in each higher grade until the number in the higher grades had declined to the number allowed by law. The latter provision was intended to reduce the number of officers eventually to the statutory limits, but since there was no provision made to ensure a sufficient number of voluntary or involuntary retirements, it had little effect.

The promotion portion of the Act of August 5 was the cause of much unrest among junior officers, who characterized it as "the system of promotion which required the death of 64 Commodores or 128 Rear Admirals to promote one Ensign."[171] In a very real sense, this portion of the Act was a highly-important cause of the naval development of the late 1880's and 1890's — it made conditions so intolerable for junior officers that they were finally driven to overt work for reform. At the time it was passed, however, it seemed acceptable and there was an obvious need for some kind of action — in 1882 there were 1817 officers on the active list, making 59 officers for each of the 31 ships in commission — and the foes of plucking and of promotion by selection had enough power to prevent the adoption of either of these systems.[172]

The Advisory Board was a more immediately successful portion of the Act. The Board began its work by reporting that the largest cruiser authorized in the Act of August 5 was too ambitious a project for a navy which had built no modern steel ships at all. The Board recommended that the authorization be changed to permit the construction of one 4000-ton and three 2500-ton steel cruisers, and one iron despatch boat.[173]

Congress eliminated one of the 2500-ton cruisers, and the naval appropriations bill of 3 March 1883 included both authorization for the remaining four ships proposed by the Board and the appropriations with which to build them.[174] Secretary William E. Chandler, who had replaced Hunt when the latter was made Ambassador to Russia, on 28 April 1883 advertised for bids on the ships. With the award of the contracts in July 1883,[175] the Navy of the 1890's was fairly begun.

Aftermath and Conclusions

Plausible as is the selection of 1882, and of the Act of August 5, 1882, as the point which marks the transition from the Old Navy to the New, this plausibility is primarily in retrospect. At the time, the transition was not at all obvious; from within, for some years, it appeared that the Navy was still declining.

Numerically this was correct. The 30% provision (reduced to 20% in 1883 but later raised again to 30%) of the Act of August 5 meant that the old wooden ships were being

rapidly retired. The four ships authorized in 1883, the *Atlanta, Boston, Chicago* and *Dolphin*, were still in the design stage, and it would be a few years until they were completed. Even then, the "ABCD's" alone would not be nearly sufficient to make up this numerical decline.

It also appeared that the ABCD's might be the result of an isolated appropriation, as were the eight ships authorized in 1873. No new ships were authorized in 1884, and, in 1885, only two cruisers and two gunboats were approved by Congress.[176]

Naval expenditures also declined during the 1880's. While the money for building the new ships was appropriated separately, the money to operate them and to pay the other expenses of the Navy came from the regular budget. Expenditures dropped from an 1880's peak in fiscal 1880 of about $14.5 million to $10.4 million in fiscal 1889.[177] The amount budgeted for "Pay of the Navy" remained roughly constant at $7.3 million, which meant that the reduction came from the other portions of the budget.

The Act of August 5 brought officer morale, at least among the junior officers, to the lowest point ever. By 1890, the Secretary of the Navy was calling the situation of junior officers "little less than alarming."[178] He noted that the average age of the officers at the tops of the Lieutenant, Lieutenant (junior grade), and Ensign lists were, respectively, 44, 34, and 32½ years, and that, under the provisions of the Act of August 5, the situation would become worse — the officers at the foot of the Lieutenant, Lieutenant (j.g.), and Ensign lists in 1890 would not achieve promotion until they were, respectively, 54, 37, and 33 years of age.[179] As mentioned, the Act of 1882 worsened the lot of junior officers so much that they were driven to attempt to reform and expand the service.[180]

For example, the establishment of the Naval War College may be viewed in this light. Commodore Stephen Luce, who proposed the latter, envisioned a post-graduate school where naval officers would learn international law, naval history, strategy, and tactics. This would be a great help in increasing the general level of competency of naval officers, but there is evidence that Luce, and many others, additionally considered the College as another source of billets for line officers.[181] The Office of Naval Intelligence, formed in 1882, was also looked upon as a means of providing employment for officers.

Yet by 1886 one Ensign could write, "There is a good time coming — in the far

distance — however, when we hope to have a few vessels that we will not be afraid or ashamed to show to foreign powers . . ."[181] Though there was to be a long, uphill struggle between "a few ships that we will not be afraid or ashamed to show" and "a Navy second to none", the climb had begun in the early 1880's.

The major reasons for the decline of the Navy during the period just examined may be stated, simplistically, as national preoccupation and professional conservatism. The first may be dealt with only in passing — perhaps the US was simply not ready to accept the implications of the status to which it aspired; i.e., that of a "first-rank power". Yet the other may be examined without broadening the topic too far.

The issue, as Elting Morison has pointed out,[183] were those of change and adaptation within an ordered, relatively isolated society. In the active professional society of the naval officer of the late 1800's, there were at any one time less than 2000 individuals, and each one knew practically all of the others, at least by reputation. Further, each individual's position was defined relative to those of all of the other members of the society — a man might spend his professional career sandwiched between the same men, from Ensign to (if they all lived that long) Admiral.[184]

In the naval society of the 1800's, the major intrusive element was steam power. At first, the steam engine and its operaters occupied a subordinate position. As the utility and reliability of steam power increased, so did the physical demands of the engine themselves and the professional demands of the engineers.

At first, all concerned agreed that steam power was just an auxiliary means of propulsion. It was useful in confined areas and in bad weather, but too vulnerable to use in battle, too unreliable to trust implicitly, and too expensive to use much at all. Sails were the primary motive power, and the engineers accepted this fact.

With the invention of the screw propeller, the engines could be placed below the waterline and thus made invulnerable to enemy fire. Marine engines became more reliable and efficient during the 1840's and 1850's, and the engineers began to aspire to higher status.

The line officer was a specialist in seamanship and in fighting. As a fighting man, he

could appreciate the tactical advantages of speed and maneuverability. Yet the normal condition of the naval officer was not fighting battles, but working his ship. He was an expert in the management of the sails, in traditional seamanship, that is, and he took great pride in his skills. Steam power threatened to make these skills obsolete.

The line officer was in the position of a skilled craftsman in today's society whose vocation is threatened by automation. His natural reaction was the "Luddite" reaction — to cling to the old ways, come what might.

The seaman was an artist. The beauty of a ship under sail was tangible to him, and it was a direct result of his skill. The engineer, in his way, was just as much an artist — yet where the engineer perceived beauty, the seaman saw only a heap of dirty, noisy, ugly machinery.[185]

The conflict between these two value systems was the origin of the steam/sail controversy. It began as a debate between two groups of intelligent, sincere, honest men. The stage of rational argument passed quickly, though, since basically the two groups were arguing from different sets of postulates. The long dispute finally ended only when enough of the older members of the seaman faction had died or retired to permit those with a different idea of seamanship to make their peace with steam.

The Navy had weathered periods of national neglect before the 1870's, and no such damage was done. Similarly, the battleship/aircraft carrier controversy was just as much a battle between the "old believers" of the big-gun school and the proselytes of air power as the earlier controversy had been between the old religion of sail and the new religion of steam. Neither technological controversy nor national neglect alone would have been so deleterious — it was the combination of the two which brought the Navy to its nadir, and the renewal of national interest and the departure of the "old guard" that set it firmly on the road to recovery.

Notes

1. Naval History Division, *The Battleship in the United States Navy*, (Washington: GPO, 1970), p. 5.

2. Harold and Margaret Sprout, *The Rise of American Naval Power*, (Princeton: Princeton University Press, 1946), pp. 80-82. (Hereafter cited as "Sprout")

3. *Ibid.*, pp. 68-69, 105-106.

4. Naval History Division, *op. cit.*, p. 7.

5. Naval History Division, *Dictionary of American Naval Fighting Ships*, (Washington: GPO, Vols. I-V, 1959-1970), Vol. V, p. 383. (Hereafter cited as "*DANFS [vol. no.]*")

6. James Phinney Baxter, *The Introduction of the Ironclad Warship*, (Cambridge: Harvard University Press, 1933), p. 17 ff.

7. Sprout, pp. 96-109, 128-138.

8. *Ibid.*, pp. 139-140.

9. *Ibid.*, pp. 146-147.

10. *Ibid.*, pp. 148-149.

11. The steam Navy in 1861 was composed of 25 screw steamers of various sizes and nine sidewheelers. From Secretary of the Navy, *Annual Report, 1865*,(Washington: GPO, 1865). (Hereafter cited as "SecNav 18xx")

12. Bruce Catton, *The Coming Fury*, (New York: Pocket Books, c. 1961), pp. 434-437.

13. Sprout, pp. 153-154; Catton, *op. cit.*, p. 475.

14. The USN purchased 418 vessels from 4 March 1861 through the end of the War. Three hundred thirteen of these were steamers. Three hundred forty ships had been sold back out of the service by the end of 1865. SecNav 1865.

15. Daniel Ammen, *The Atlantic Coast*, (New York: Charles Scribner's Sons, 1883), p. 11.

16. See reprint of Board report, quoted in Frank M. Bennett, *The Steam Navy of the United*

States, (Pittsburgh: Warren & Co., 1896), pp. 264-272. (Hereafter cited as "Bennett")

17. *DANFS* III, p. 758.

18. The idea of the ram's irrestible force was given credence beyond its worth by the Austrian/Italian Battle of Lissa, in which the Austrian flagship rammed and sank an Italian ship which was dead in the water. The attention of naval officers was firat recalled to the ram, however, by the *Virginia*'s sinking of USS *Cumberland*. The ram fell into disuse after the development of the torpedo made it very dangerous for ships to attempt to close to ram each other.

19. Attorney General Edward Bates, quoted in Bruce Catton, *Terrible Swift Sword*, (New York: Pocket Books, c. 1963), p. 109; see also pp. 102-110.

20. *DANFS* III, pp. 758-761, 763-771, 776.

21. Chief Engineer Benjamin F. Isherwood, Chief of the Bureau of Steam Engineering, quoted in Bennett, pp. 576-77.

22. Ephraim D. Adams, *Great Britain and the American Civil War*, Volume II, (Gloucester: Peter Smith, 1957), pp. 116-151 contains a full account. See also *DANFS* V, pp. 490-491. The Laird rams later served in the Royal Navy as HMS *Scorpion* and *Wyvern*. Another ram, built in France, escaped therefrom just before the collapse of the Confederacy. Upon learning of the dissolution of the CSA, her captain put in at Havana and sold the ship to pay his crew. This ship, CSS *Stonewall*, later served in the United States and Japanese Navies.

23. *DANFS* III, pp. 758-761, 763-771, 776.

24. Catton, *Coming Fury*, pp. 350-352.

25. SecNav 1882, p. 33. It has been suggested by Walter Herrick, *The American Naval Revolution*, (Baton Rouge: Louisiana State University Press, 1966), p. 13, that this decline was "occasioned" by Welles' policy of taking over merchant vessels for conversion to warships. I find this difficult to accept. (Hereafter cited as "Herrick")

26. Sprout, p. 162-164.

27. *Ibid.*, p. 165.

28. SecNav 1865, p. IX.

29. Sprout, p. 165, claims "almost 700", but SecNav states that 418 had been purchased since 1861, 208 "commenced", and "almost 100" on hand. Since by no means all of the 208 "commenced" were delivered to the Navy, and since the Navy had not escaped losses during the War, I feel the lower figure is preferable.

30. SecNav 1865, p. IX.

31. *Ibid.*, p. XI. Includes receiving ships, tugs, training ships, storeships, and tenders.

32. *Ibid.*, pp. XXXI-XXXII.

33. *Cyclopedia of American Government*, edited by Andrew McLaughlin and A.B. Hart, (New York: D. Appleton & Co., 1914), Volume II, p. 16.

34. SecNav 1865.

35. *Ibid.*, p. 13.

36. SecNav 1866, p. 177 (Report of the Bureau of Steam Engineering) and p. 159 (Report of the Bureau of Construction and Repair).

37. *Ibid.*, pp. 159-160.

38. *Encyclopedia Americana*, 1970 edition, Vol. VI, p. 811.

39. Naval History Division, *Monitors of the United States Navy, 1861-1937*, (Washington: GPO, 1969), p. 28. (Hereafter cited as "*Monitors*")

40. SecNav 1867.

41. SecNav 1868-69.

42. SecNav 1868-69, p. 96.

43. *Monitors*, pp. 10, 18-20.

44. SecNav 1861, quoted in Bennett, p. 229.

45. United States, *Regulations for the Government of the Navy, 1865*, (Washington: GPO, 1865), para. 387.

46. Ibid., para. 391.

47. SecNav 1865, p. XXIII.

48. Daniel Ammen, *The Old Navy and the New*, (Philadelphia: J.B. Lippincott, 1891), pp. 430-431. It must be noted that the Royal Navy managed to delay amalgamation until after the Second World War. The reason, I feel, for British success is that there was enough national attention to the Navy to ensure that steam would be adopted by the line without last-ditch reaction. The line adopted the results of steam power but not the production of it. I feel also that the reason that amalgamation was so long delayed, despite the tactical adoption of steam, was the British tradition of the officer being of the upper or upper-middle classes, whereas the "mechanic" was usually of lower birth.

49. Information from reports of Bureau of Equipment and Recruiting, contained in SecNav 1867-1881. Prices paid included freight and handling. However, even in 1890 the Navy paid $6.80 per ton for coal.

50. Coal consumption data from Bennett, pp. 566-567.

51. To operate a reciprocating steam engine at high speed means accelerating and decelerating the pistons many times per minute. In the case of the *Wampanoag*, the pistons traveled a four-foot stroke at over 30 complete cycles per minute. The stresses were considerable. As late as 1898, the naval world was astonished at the USS *Oregon* steaming 13,00 miles without a major breakdown.

52. ADM Porter's Report, SecNav 1871-72, p. 63.

53. RADM Edward Simpson, "The Navy and Its Prospects of Rehabilitation," *PUSNI*, Vol. XII No. 1, p. 17.

54. Isherwood, quoted in Bennett, pp. 576-577.

55. Data from "Reports of the Trial Trip of the United States Steamer Wampanoag, At sea (armed and equipped,) February 7 to February 17, 1868" reprinted in Bennett, pp. 555-567.

56. *Ibid.*

57. *Ibid.*, Report of Board of Engineers.

58. Bennett, pp. 568-569. This speed was about two knots faster than the *Adriatic*'s sustained sea speed.

59. See Bennett, p. 518.

60. Bennett, p. 571.

61. Charles A. Dana in *The New York Sun*, quoted in Candace Stone, *Dana and The Sun*, (New York: Dodd, Mead, 1938), p. 90.

62. Allan Nevins, *Hamilton Fish*, (New York: Dodd, Mead, 1936), p. 569. (Hereafter cited as "Nevins")

63. *Ibid.*, pp. 107-108.

64. Adam Badeau, *Grant in Peace*, (Freeport: Books for Libraries Press, 1971; first pub. 1887), p. 163.

65. *Ibid.*, pp. 153-155.

66. *Ibid.*, p. 163.

67. Nevins, pp. 109-110.

68. Herrick, p. 15 and note eight thereto; Peter Karsten, *The Naval Aristocracy*, (New York: The Free Press, 1972), pp. 66-67. (Hereafter cited as "Karsten")

69. Bennett, p. 612-613.

70. Quoted in Bennett, p. 614.

71. *Ibid.*

72. Karsten, p. 63 and note 14 thereto.

73. *Ibid.*, p. 67 and note 28 thereto. See also Bennett, pp. 616-621. The Engineer Corps did not remain in quite so inferior a position, as in 1870 Congress established new rank equivalents for engineers. However, engineers still held relative, not absolute, rank, and the engineers had fewer senior billets (CDR and CAPT) and many fewer intermediate (LCDR) billets than before. The grade of Third Assistant Engineer was abolished.

74. Nevins, pp. 815-816.

75. SecNav 1869, *passim*.

76. Information from SecNav 1869. The addition does not agree and ships are not listed by name, making it difficult to cross-reference with the lists of the various squadrons.

77. Sprout, pp. 166-175.

78. *Ibid.*, p. 174.

79. Karsten, p. 312 and note 66 thereto; also pp. 300-317, *passim*.

80. *Ibid.*, p. 312.

81. *Ibid.*, p. 310.

82. *Ibid.*, pp. 277-325 provides an overview of this. Sprout, pp. 179-180, and Herrick, p. 21, mention it briefly.

83. Karsten, p. 358 for information on Mahan, who was Alfred T. Mahan's younger brother.

84. *Ibid.*, pp. 327-328.

85. Ammen claimed, "In the discharge of the duties of thie Bureau . . . I am not conscious of having endeavored to visit the displeasure of the Department upon any individual as a mere exercise of power from personal considerations . . ." Ammen, *Old Navy and the New*, p. 463. Ammen leaves much unsaid in this passage.

86. Morison, in USAF History Office, *Science, Technology, and Warfare*, (Washington: GPO, 1969), p. 193.

87. Porter to John Lenthall, Chief of the Bureau of Construction and Repair, 1867; quoted in Karsten, p. 311. See also Karsten, chapters six and seven, *passim*.

88. ADM Porter's Report, 1874, in SecNav 1874, p. 209.

89. SecNav 1865.

90. SecNav 1866 and later.

91. SecNav 1871-72, p. 25.

92. Many examples in Karsten, chapters four and five.

93. Edwin A. Falk, *Fighting Bob Evans*, (New York: Jonathan Cape and Harrison Smith,

1931), pp. 118-125, gives an account of this incident, which was precipitated by an overly self-important and tactless American Consul.

94. The Spanish gunboat *Tornado* captured the *Virginius* in international waters on suspicion of running arms to Cuban rebels. The incident occurred 5 November 1873; the US protested to Spain but nothing out of the ordinary really happened until 12 November, when word arrived from Cuba saying that the Spanish had executed 53 of the passengers and crew as "pirates". The situation became serious, the US delivered an ultimatum, and the Spanish eventually gave in. It was afterwards proved that the ship was not entitled to American registry, but the issue at the time was that a Spanish ship had stopped a ship flying American colors and arrested her, and the Spanish had summarily executed passengers and crewmen.

95. The "Squadron of Evolution" was not formed until 1889.

96. Assuming a height-of-eye of 100 feet, the horizon is 11.4 miles away. Thus, in clear weather, a lookout atop the mast could detect another ship's mast over 20 miles away. If the stranger were under steam, the smoke could be seen much farther away. The stranger could be identified well before she came hull-up; i.e., twelve miles away. Naval gunnery was accurate to no more than 5000 yards at this time.

97. SecNav 1869-70, p. 142. The Report is printed in full, pp. 142-209, and the minority report in full, pp. 109-210.

98. *Ibid.*, p. 151.

99. *Ibid.*, p. 150.

100. *Ibid.*, p. 173. Bennet, who appears to be quite pro-Isherwood, portrays Isherwood's enemies, p. 518.

101. SecNav 1869-70, p. 148.

102. Bennett, pp. 571; *DANFS* I, p. 42.

103. *USNIP*, Vol. I No. 8, p. 166, pp. 168-169. COMMO Parker went on to advocate "rams, torpedo-boats, and artillery-vessels, all of which should be steamers of great speed, having auxiliary sail power . . . when the price now paid for surplus masts, spars, rigging, and cordage [be] deducted . . . an efficient steam navy can be maintained at a cost but little exceeding that of our present nondescript one."

104. The Navy Yard at Philadelphia was moved to League Island in the late 1860's to provide a fresh-water mooring for the monitors; in fresh water their ironwork would not rust as much as in salt. See SecNavy 1869-70, pp. 153, 173, 174-176 for descriptions of machinery preservation.

105. Bennett, pp. 582-583.

106. Nevins, p. 585.

107. *Puck* parodied Gilbert and Sullivan:
As Secretary, I made such a name,
That a millionaire I soon became.
I sold new ships for the price of junk,
And those I repaired invariably sunk
Or went out of sight so effectualee
That soon I had demolished the whole Navee.

Quoted in Theodore Roscoe and Fred Freeman, *Picture History of the U.S. Navy*, (New York: Charles Scribner's Sons, 1956), para. 935.

108. Ellis P. Oberholtzer, *History of the United States Since the Civil War*, (New York: MacMillan, Vol. III-1926, Vol. IV-1931), Vol. IV, p. 177. Note also ADM Porter's Report, in SecNav 1881, p. 113, where he states, about the Boston Navy Yard, ". . . it should be strictly supervised, to be sure it is not made use of for political purposes. There has been more waste (to use the mildest term) in this yard, for the past twelve years, than in any other; and the Department has had a great deal of trouble with the political factions who claim to control the establishment."

109. Bennett, p. 630, reprints the censure motion.

110. *Monitors*, pp. 15, 18, 19-20, 39-42.

111. Bennett, p. 629.

112. Karsten, p. 280. Chapter six explores this problem.

113. SecNav 1877, pp. 6-8. If one omits surgeons, chaplains, and paymasters, the ratio between enlisted and officers of the grade of equivalent grade of Ensign and above is 6.6/1.

114. *Cyclopedia of American Government*, Vol. II, p. 16.

115. Paul Studenski and Herman Kroos, *Financial History of the United States*, 2nd edition, (New York: McGraw Hill, 1963), pp. 171-175 provides background. When Congress re-funded the debt in the late 1860's, they set the interest rate on the 20- and 30-year bonds they issued at well below the then-current interest rate and, to compensate, made the bonds non-callable. Interest rates continued to fall, until the bonds were

selling at a premium, but due to the non-callable nature of the bonds, the Treasury could not buy them back out of the surplus without making purchases on the open market at an inflated price. If not for the non-callable feature, the debt could have been retired much sooner. The Navy Department figures Studenski and Kroos give on pp. 162-163 are not even close to those reported by the Secretarys of the Navy in the annual statements of expenditures; the other figures in this table may be suspect also.

116. ADM Porter's Report, SecNav 1874, p. 221.

117. SecNav 1881, p. 35

118. *Ibid.*

119. *Ibid.*, ADM Porter's Report, p. 97. This policy also placed expenditures safely in the uncertain future and practically begged for indefinite delay on the ground that warships at any given time had not quite reached perfection.

120. Brassey's *Naval Annuals* provide dates of laying down and commissioning in their sections describing the world's warships; the interval needed to build a ship in America is always longer (during this period) than that required in England.

121. SecNav 1876, p. 5.

122. SecNav 1874, ADM Porter's Report, p. 210. Emmanuel R. Lewis, *Seacoast Fortifications of the United States*, (Washington: Smithsonian Press, 1969), is an excellent survey of the coast defense systems of the US.

123. For instance, the "*Baltimore* incident" in 1891, in which a group of American sailors on liberty in Valparaiso were attacked by a mob, apparently with official connivance. One man was killed and another mortally wounded, and several others were seriously wounded. Several Chileans received minor injuries. War was averted only with difficulty.

124. Bennett, pp. 643-647.

125. *DANFS* III, p. 405.

126. Compare ships' data USS *Trenton* and HMS *Dreadnought*, the latter completed in 1875, in Lord T.A. Brassey, *Naval Annual 1886*, (Portsmouth: J. Griffin & Co., 1886), pp. 285, 159 respectively.

127. *DANFS* II, p. 356. For *Alliance/Adams* class, see *DANFS* I, pp. 9, 33.

128. SecNav 1871-72, p. 45.

129. *Ibid.*

130. Bureau of Ordnance Report, SecNav 1875, p. 88.

131. Note, for example, the difference between the American XV-inch Dahlgren smoothbore, which weighed about 21 tons, and the British 25-ton 11" muzzle-loading rifle. The XV-inch shot was not as heavy as the 11" shot, and had a range of about 1700 yards. The 11" could penetrate ten inches of wrought iron at 1700 yards and had a much greater maximum range. The British model was installed in ships built around 1871 and was soon obsolescent. *Naval Annual 1886* for British ordnance, pp. 158, 163, 328, 384-5; *DANFS* III pp. 815-817 for American XV-inch. Note also in *Naval Annual 1886*, p. 396, where it is noted that the largest breech-loading rifle finished in the US by 1886 was a five-inch.

132. SecNav 1876, p. 5.

133. Quoted in Karsten, p. 278.

134. Wm. S. Myers, *The Republican Party*, (New York: The Century Co., 1928.), p. 228; Nevins, p. 838.

135. Myers, *op. cit.*, p. 241. Senator Oliver P. Morton of Indiana was apparently the person behind this appointment.

136. Sprout, p. 181 and note 63 thereto.

137. SecNav 1877, p. 12.

138. *Ibid.*

139. *Ibid.*, p. 13.

140. SecNav 1879, p. 26.

141. Herrick, pp. 19-20.

142. For example, Porter stated in 1871, "A s far as it goes, our little Navy does its work bravely, but it looks very inefficient compared to the average navies of Europe." (Sec–Nav 1871, p. 47)

143. SecNav 1875, p. 299.

144. *Ibid.*

145. *Ibid.* It would appear that Herrick is incorrect when he states, p. 18, that Porter was "converted to the ironclad persuasion" by COMMO Stephen Luce. If by "ironclads" one means monitors, Porter had realized their utility duri the War Between the States; if one means sea-going armored battleships, as late as 1884 Porter was proclaiming the need for monitors. (SecNav 1884, p. 63) I have noted in Herrick a tendency to be careless about details; e.g., on p. 23 top, he has his chronology confused — Congress did not investigate Robeson until 1876 — and is completely confused about the 1873 building program; on p. 29 and note 66 thereto, he has effectively interchanged the definitions of protected and armored cruisers. Similar examples occur frequently.

146. SecNav 1875, pp. 302-303, 303.

147. SecNav 1877, pp. 8-12; SecNav 1878, pp. 12-16.

148. LT Charles Belknap, "The Naval Policy of the United States," *USNIP*, Vol. VI No. 14, p. 391.

149. Sprout, p. 184.

150. *Ibid.*, p. 183.

151. Bennett, p. 771.

152. *Ibid.*

153. *Cyclopedia of American Government.*

154. *Naval Annual 1886* gives tabular data, including construction dates for British and foreign ships, and line drawings of many British and some foreign ships.

155. SecNav 1881, p. 27.

156. *Ibid.*, p. 29. The report of the Rodgers Board is printed here in full, pp. 28-38, and the supporting documents pp. 47-81; the minority report is pp. 38-47.

157. *Ibid.*, p. 30.

158. *Ibid.*, p. 37.

159. *Ibid.*, p. 31. It must be noted that the idea that the "New Navy" was instrumental in establishing the basic steel industry in the US is invalid, although the Board used a similar argument. By 1876 the US was second only to Britain in steel output. (Elting Morison, *Men, Machines, and Modern Times*, (Cambridge: MIT Press, 1966), pp. 184, 196.) The Navy, however, would appear to be responsible for the initiation of really heavy forging mills.

160. SecNav 1881, pp. 30-31.

161. *Ibid.*, pp. 38-46.

162. *Ibid.*, pp. 34-36.

163. *Ibid.*, pp. 35.

164. *Ibid.*, p. 36.

165. *Ibid.*

166. *Ibid.*

167. *Ibid.*

168. *Ibid.*, p. 102.

169. SecNav 1884, pp. 15-16.

170. *Ibid.*, also SecNav 1881.

171. Quoted in Karsten, p. 285.

172. SecNav 1882, p. 8.

173. Bennett, p. 777.

174. *DANFS* I, pp. 203-204.

175. All four contracts were awarded to John Roach, a prominent Republican. The unsuccessful bidders, notably Wm. Cramp and Sons, of Philadelphia, pressed the idea that Roach had received the contracts through unfair influence. The Democratic newspapers, especially *The Sun*, pushed this idea, as they had pushed the "Roach, Robeson, Robbers" and "George M. Robberson" themes earlier. Roach's bids,

however, totalled $315,000 lower than Cramps', and he bid lower on each of the four ships. In awarding the contracts to Roach, Secretary Chandler was doing what the law required. Chandler apparently realized immediately the way in which the opposition would react to this apparent favoritism. In his sympathetic biography of Roach, Leonard Swann (*John Roach, Maritime Entrepreneur*, (Annapolis: Naval Institute Press, 1965) records that Chandler, upon being asked by Cramps' representative if he were going to award all of the contracts to Roach, said, "I don't see how I can help it," and went on to point out to the representative the legal requirements. The ABCD's caused Roach's bankruptcy, however. The Bureau of Construction and Repair insisted upon changing the specifications and plans during the construction process. They claimed that Roach had not lived up to his contract, and refused to pay him. Roach, on the other hand, claimed that the Bureau, by making so many changes, had caused him a year or more delay; the Bureau admitted to six months' delay. A slump in business left Roach with most of his shipyard occupied by government work for which he was not being paid, and thus no liquid capital and no way to build orders for private shipowners. The ships were completed in government yards, and performed up to their contract specifications. The idea that they did not so perform appears to be due to a move by (Democratic) Secretary Whitney to discredit his (Republican) predecessor. Herrick, p. 30, and Sprout, pp. 192-193, appear to believe that Chandler had a choice in awarding the contracts. This is simply incorrect.

176. Bennett, pp. 788-790.

177. SecNav 1880-1890.

178. SecNav 1890, p. 27.

179. *Ibid.*, pp. 27-28.

180. Karsten, pp. 292-300.

181. Karsten, p. 300; p. 345 and note 58 thereto. Note also that Bennett's history, otherwise exhaustive, does not mention the War College at all.

182. Quoted in Karsten, pp. 300-301.

183. Eleting E. Morison, *Men, Machines, and Modern Times*, pp. 19-20.

184. Karsten, pp. 61-65.

185. Rudyard Kipling spoke for the engineer in "M'Andrew's Hymn" —

> . . . Lord, send a man like Robbie Burns to sing the Song o'Steam!
> To match wi' Scotia's noblest speech yon orchestra sublime
> Whaurto — uplifted like the Just — the tail-rods mark the time.
> The crank-throws give the double-bass, the feed-pump sobs an' heaves,
> An' now the main eccentrics start their quarrel on the sheaves:
> Her time, her own appointed time, the rocking link-head bides,
> Till — hear that note? — the rod's return whings glimmerin' through the guides. . . .
>
> From coupler-flange to spindle-guide I see Thy Hand, O God—
> Predestination in the stride o' yon connecting-rod.
> John Calvin might ha' forged the same—enorrmous, certain, slow—
> Ay, wrought it in the furnace-flame—*my* "Institutio."

(From *Rudyard Kipling's Verse*, Inclusive Edition, (Garden City: Doubleday, Doran & Co., 1931), pp. 144, 137.

Annex I

Secretaries of the Navy, 1860-1890

From	To	Name
MAR 1857	4 MAR 61	Isaac Toucey
4 MAR 61	4 MAR 69	Gideon Welles
4 MAR 69	5 MAR 69	William Faxon (*ad interim*)
5 MAR 69	25 JUN 69	Adolph E. Borie
25 JUN 69	12 MAR 77	George M. Robeson
12 MAR 77	20 DEC 80	Richard W. Thompson
20 DEC 80	6 JAN 81	Alex. Ramsey (Secretary of War; *ad interim*)
6 JAN 81	5 MAR 81	Nathan Goff, Jr.
5 MAR 81	12 APR 82	William H. Hunt
12 APR 82	6 MAR 85	William E. Chandler
6 MAR 85	5 MAR 89	William C. Whitney
5 MAR 89	6 MAR 93	Benjamin F. Tracey

—*from* ***Cyclopedia of American Government***

Annex II

Party Control of Executive and Congress, 1860-1890

Years	Cong	Pres	House	Senate
59-61	36th	D	R	D
61-63	37th	R	R	R
63-65	38th	R	R	R
65-67	39th	R	R	R
67-69	40th	R	R	R
69-71	41st	R	R	R
71-73	42nd	R	R	R
73-75	43rd	R	R	R
75-77	44th	R	D	R
77-79	45th	R	D	R
79-81	46th	R	D	D
81-83	47th	R	R	tie
83-85	48th	R	D	R
85-87	49th	D	D	R
87-89	50th	D	D	R
89-91	51st	R	D	R

Annex III

Government Revenue Surplus/Deficit, 1860-1885

(Figures in $millions. - indicates deficit.)

Fiscal Year	$millions	Fiscal Year	$millions
60	-7.1	73	36.9
61	-25.1	74	-1.3
62	-422.8	75	9.4
63	-602.6	76	25.0
64	-821.9	77	39.7
65	-973.8	78	20.5
66	.1	79	5.4
67	116.1	80	68.7
68	6.1	81	101.1
69	36.0	82	145.5
70	102.3	83	132.9
71	91.3	84	104.4
72	94.1	85	63.5

Figures from ***Cyclopedia of American Government****, Vol. II p. 16.*

Studenski & Kroos, ***Financial History of the United States****, give figures which differ slightly in most years and radically in others; however, since Studenski & Kroos' figures for the Navy Department bear little relation to those reported in the SecNav Annual Reports, I have used those of the* ***Cyclopedia****., feeling that they are generally more reliable.*

Annex IV

US Foreign Trade carried by US vessels

Year	Per cent
1840	82.9
1845	81.7
1850	72.5
1855	75.6
1860	66.5
1865	27.7
1870	35.6
1875	25.8
1880	17.4
1881	16.0
1882	15.5

From ***Secretary of the Navy Annual Report 1882****, p. 33.*

Annex V

Naval Expenditures 1867-1879

Year	Expenditure	Year	Expenditure
67	31,034,011.04	79	13,343,317.79
68	20,120,394.62	80	12,916,639.45
69	20,081,285.00	81	14,450,789.86
70	18,985,165.11	82	13,936,294.96
71	19,265,240.52	83	13,918,833.78
72	17,694,685.76	84	14,315,623.26
73	19,552,272.16	85	13,337,867.72
74	26,254,155.82	86	12,272,626.86
75	18,825,526.97	87	10,835,102.25
76	17,937,354.72	88	10,797,547.94
77	14,074,113.27	89	10,437,902.57
78	17,468,392.65		

Data from ***SecNav Reports****. The figures given here are for appropriations spent during the indicated fiscal year. The appropriations themselves are always higher. To the expenditures for each fiscal year must be added money spent to pay bills from the last year and the year before that; the former averages around $300,000 and the latter around $30,000.*

Annex VI
Naval Officer Rank Structure

ADM	Admiral	Established during War Between the States
VADM	Vice-Admiral	Established during War Between the States
RADM	Rear Admiral	Established during War Between the States
	Flag Officer	Superseded by RADM, VADM, ADM grades
COMMO	Commodore	Unofficial before War Between the States, but established officially then
CAPT	Captain	
CDR	Commander	
LCDR	Lieutenant Commander	Established during War Between the States. Originally "Lieutenant, Commanding"
LT	Lieutenant	
LTJG	Lieutenant, Junior Grade	Formerly "Master"
ENS	Ensign	
MIDN	Midshipman	

Bibliography

Adams, Ephraim D. *Great Britain and the American Civil War.* Two vols. Gloucester (Mass.): Peter Smith, 1957. (c. 1925)

Air Force History, Office of. *Science, Technology and Warfare: Proceedings of the Third Military History Symposium.* Washington: Government Printing Office (Hereafter GPO), 1969.

Ammen, RADM Daniel. *The Atlantic Coast.* New York: Charles Scribner's Sons, 1883.

———. *The Old Navy and the New.* Philadelphia: J.B. Lippincott, 1891.

———. "The Purposes of a Navy and the Best Means of Rendering It Efficient." *United States Naval Institute Proceedings* (Hereafter *USNIP*), Vol. V (13 February 1879), pp. 119-132.

Anonymous. "Iron and Steel in Vessels of War." *USNIP* Vol VIII No. 20, pp. 267-284. [A discussion held by the Boston Branch of the Institute.]

Badeau, Adam. *Grant in Peace.* Freeport (NY): Books for Libraries Press, 1971. (First pub. 1887)

Baxter, James Phinney. *The Introduction of the Ironclad Warship.* Cambridge: Harvard University Press, 1933.

Belknap, LT Charles. "The Naval Policy of the United States." *USNIP*, Vol. VI No. 14, pp. 375-391.

Bennett, Passed Ass't. Engineer Frank M. *The Steam Navy of the United States.* Pittsburgh: Warren and Co., 1896.

Bowles, Ass't. Naval Constructor F.T. "Our New Cruisers." *USNIP*, Vol. IX No. 4, pp. 595-631.

Brassey, Lord T.A. *The Naval Annual, 1886.* Portsmouth: J. Griffin and Co., 1886. [A yearly series from 1886-date.]

Catton, Bruce. *The Coming Fury.* New York: Pocket Books, c. 1961. [This and the following two books are Catton's *Centennial History of the Civil War.* They are arranged here in order rather than by alphabetical order of titles.]

———. *Terrible Swift Sword.* New York: Pocket Books, c. 1963.

———. *Never Call Retreat*. New York: Pocket Books, c. 1965.

Chamberlin, Everett. *The Struggle of '72. The Issues and Candidates of the Present Political Campaign*. Chicago: Union Publishing Co., 1872.

Chambers, ENS W.I. "The Reconstruction and Increase of the Navy." *USNIP*, Vol. XI No. 1 (1885), pp. 3-83.

Chandler, William Eaton. *The Beginnings and Progress of the New American Navy*. Washington: np, 1892. [Speech given in the Senate.]

Clark, George R., and Wm. Stevens, Carroll S. Alden, Herman F. Krafft. *A Short History of the United States Navy*. Philadelphia: J.B. Lippincott Co., 1911.

Coolidge, Louis A. *Ulysses S. Grant*. Boston: Houghton Mifflin Co., 1904.

Curtis, Francis. *The Republican Party 1854-1904*. Two vols. New York: G.P. Putnam's Sons, 1904.

Davis, George T. *A Navy Second to None*. New York: Harcourt, Brace and Co., 1940.

Falk, Edwin A. *Fighting Bob Evans*. New York: Jonathan Cape and Harrison Smith, 1931.

Fish, Carl Russel. *The Civil Service and the Patronage*. New York: Russell and Russell, 1963. (First pub. 1904)

Gibbons, Wm. G. "The Marine Ram, as Designed by Rear Admiral Daniel Ammen." *USNIP*, Vol. VIII No. 20, pp. 209-220.

Herrick, Walter R., Jr. *The American Naval Revolution*. Baton Rouge: Louisiana State University Press, 1966.

Hoff, CDR William Bainbridge. "A View of Our Naval Policy and a Discussion of Its Factors." *USNIP*, Vol. XII, pp. 121-139.

Hunt, Thomas. *Life of William H. Hunt.* Brattleboro (Vt.): E.L. Hildreth and Co., 1922.

Karsten, Peter. *The Naval Aristocracy*. New York: The Free Press, 1972.

Lewis, Emmanuel R. *Seacoast Fortifications of the United States*. Washington: Smithsonian Institution Press, 1970.

Lovette, Leland P. *Naval Customs, Traditions, and Usage*. 3rd edition. Annapolis: US Naval Institute Press, 1939.

MacLaughlin, Andrew C., and A.B. Hart, eds. *Cyclopedia of American Government*. New York: D. Appleton and Co., 1914.

Morison, Elting E. *Admiral Sims and the Modern American Navy*. Boston: Houghton Mifflin Co., 1942.

———. *Men, Machines and Modern Times*. Cambdirge: MIT Press, 1966.

———. *The War of Ideas: The United States Navy 1870-1890*. Harmon Memorial Lecture in Military History, Number XI. Colorado Springs: USAF Academy, 1969.

Myers, Wm. S. *The Republican Party: A History*. New York: The Century Co., 1928.

Naval History Division, Navy Department. *American Ships of the Line*. Washington: GPO, 1969.

———. *The Battleship in the United States Navy*. Washington: GPO, 1970.

———. *Civil War Naval Chronology*. Washington: GPO, 1971.

———. *Dictionary of American Naval Fighting Ships* (Hereafter *DANFS*). Washington: GPO, Vol. I-1959, Vol. II-1963, Vol. III-1968, Vol. IV-1969, Vol. V-1970.

———. *Monitors of the United States Navy, 1861-1937*. Washington: GPO, 1969.

Nevins, Allan. *Hamilton Fish*. New York: Dodd, Mead and Co., 1936.

Oberholtzer, Ellis P. *A History of the United States Since the Civil War*. New York: MacMillan, Vol. III-1926, Vol. IV-1931.

Oden, Archibald, ed. *Navy Yearbook 1917-1918*, 65 Congress 3rd Session, Senate Document 418. Washington: GPO, 1919.

Parker, COMMO Foxhall A. "Our Fleet Maneuvers in the Bay of Florida." *USNIP*, Vol. I No. 8, pp. 163-178.

Ridpath, John Clark. *The United States: A History*. Boston: United States History Co., 1891.

Roscoe, Theodore, and Fred Freeman. *Picture History of the United States Navy*. New York: Charles Scribner's Sons, 1956.

Sargent, LT Nathan. "Suggestions in Favor of more Practical and Efficient Service Exercises." *USNIP*, Vol. X No. 29, pp. 233-240.

Schroeder, LT Seaton. "The Type of Armored Vessel and Cruiser Best Suited to the Present

Needs of the United States." *USNIP*, Vol. VII No. 15, pp. 85-100. [Runner-up, Prize Essay Contest.]

Simpson, RADM Edward. "The Navy and Its Prospects of Rehabilitation." *USNIP*, Vol. XII No. 1, pp. 1-39.

Sprout, Harold, and Margaret Sprout. *The Rise of American Naval Power*. Princeton: Princeton University Press, 1946.

Stampp, Kenneth M. *The Era of Reconstruction, 1865-1877*. New York: Alfred A. Knopf, 1965.

Stone, Candace. *Dana and The Sun*. New York: Dodd, Mead, 1938.

Studenski, Paul, and Herman E. Kroos. *Financial History of the United States*, 2nd edition. New York: McGraw-Hill, 1963.

Swann, Leonard A. *John Roach, Maritime Entrepreneur*. Annapolis: US Naval Institute Press, 1965.

United States. *Regulations for the Government of the United States Navy, 1865*. Washington: GPO, 1865.

———. *Annual Report of the Secretary of the Navy*. 1865, 1866-67, 1867, 1868-69, 1869-70, 1871-72, 1872, 1873, 1874-75, 1875, 1876, 1877, 1878, 1879, 1880-81, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890. Washington: GPO.

Very, LT E.W. "High Powered Guns: A Study." *USNIP*, Vol. VIII No. 20, pp. 233-246.

———. "The Type of Armored Vessel and Cruiser Best Suited to the Present Needs of the United States." *USNIP*, Vol. VII No. 15, pp. 43-83. [Prize Essay]

Werner, M.R. *Tammany Hall*. New York: Greenwood Press, 1968. (c. 1932)

West Richard S.J. *Admirals of American Empire*. Indianapolis: Bobbs-Merrill, 1948